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Monthly Message

This is the occasion for congratulations. First, the *Armed Forces Medical Journal* makes its appearance in new format. I am sure that this is a great improvement over the past. We hope also that the quality of the articles which have appeared in it will not only continue at a high and informative level but may even improve as well, as should always be the case. Over the past two years the editors, Captain Bennett F. Avery, MC, USN, and now Colonel Robert J. Benford, USAF, MC, have devoted much time and energy to the *Journal.* Captain Avery is now the Director of the MEND Program and Colonel Benford has returned to his former position as editor-in-chief of the *Journal.* He now has a full-time civilian Associate Editor, May Sherman, M.D., formerly with the National Institutes of Health. We wish the *Journal* the greatest success and continued growth.

We have failed to note before but this year marks the tenth anniversary of the United States Air Force Medical Service. If one considers the changes, or perhaps one should say the last extension out into space, and the problems that confront the Air Force compared with those in 1949, they are almost breathtaking. One cannot but be amazed at the way the Medical Service has kept abreast of these problems and is constantly seeking answers for new questions as they arise. The medical research facility at Randolph Air Force Base has been transferred recently to its new quarters at Brooks Air Force Base, near Lackland Air Force Hospital, and here in conjunction with the work of the Aerospace Medical Laboratory at Wright-Patterson Air Force Base and the Air University at Maxwell, we may expect even better accomplishments.

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Energy Requirements of Military Personnel During Basic Training

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DURING the past 4 years, nutritional surveys have been in progress to collect data on the nutrient composition of the ration as consumed in the Army mess by the soldier undergoing basic training, and on that portion of his diet which is obtained from the post exchange and other outside sources. Observations also were made on the various food losses and wastes. The over-all purpose was to determine the nutritional adequacy of the ration (as formulated in the U.S. Army master menu) and its ability to supply the physiologic energy and nutrient needs of the soldier under temperate climatic conditions.

The studies were conducted on two basic training companies at Camp Pickett, Va.,[1] two basic training companies at Fort Riley, Kans.,[2] three basic training units at Fort Ord, Calif.,[3] and two training cycles of airborne trainees at Fort Benning, Ga.[4]

The physical activities of the units studied fell roughly into two categories: moderate to heavy activity, as in the seven companies in basic training at Camp Pickett, Fort Riley, and Fort Ord; and very heavy activity, as exemplified by the intensive airborne training and physical conditioning in the two training cycles at Fort Benning.

The majority of the soldiers were draftees between the ages of 17 and 25 years; most of these were under 20 years of age. Many of the soldiers were still growing and therefore possibly required a higher nutrient intake for growth purposes than fully mature soldiers.

These studies were made for several reasons. First, they help define a soldier's energy needs at a critical time in his career. Certainly, his nutrient needs in basic training are high, perhaps greater than at any other time in his Army life. Second, with this knowledge

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of the upper energy needs, it is possible to define more rationally than before the basic dietary standards for the Army, and to apply the standards for feeding troops in accordance with their nutritional requirements. At present, the prescribed intake by Army regulations [5] for the physically active soldier is 3,600 calories, but the term "physically active" is not clearly defined. Does basic training fall within this classification? If not, these troops should be considered as engaged in strenuous activities and requiring an increased caloric intake.

At some variance with the Army standards, the Food and Nutrition Board of the National Research Council [6] recommends the following dietary allowances, which represent "normally desirable goals and objectives" for men at age 25 years, weighing 65 and 70 kg: 65-kg men, heavy labor—seldom to exceed 25 percent above the standard of 3,000 calories, or 3,750 calories; and 70-kg men—seldom to exceed 25 percent above the standard of 3,200 calories, or 4,000 calories. Note that these allowances are liberal, whereas the Army standards are minimal allowances. It is evident that the descriptive terms permit considerable latitude for the allowances at various levels of activity. The nutrient requirements for various duties in the Army need definition.

The master menu, without extra allowances, was the basis for feeding in the four surveys covered in this report. The menu, which is the guide throughout the Army, is based upon the Army minimum standard of 3,600 calories for a "physically active" young male soldier. The menu is calculated to yield at least 3,600 *edible* calories, after deducting 500 to 800 *edible* calories for plate scrapings and kitchen losses (table 1). Thus, the master menu is calculated to yield a total

Table 1. ***Caloric content per man per day of the edible food losses in seven Army installations***

Camp	Plate loss and tray washings	Kitchen loss*	Fat drippings and grease trap**	Total edible food loss
Camp Pickett	287	240	193	720
Fort Riley	286	347	196	829
Fort Benning	263	205	334	802
Fort Ord	260	—	—	—
Weighted average 3 training camps	274	251	263	*788
Percent of total calories	34.7	31.9	33.4	100

*Kitchen loss (all edible food that is left over, and eventually discarded).
**Fat drippings, grease trap (fat drippings from meats that are discarded).

of 4,100 to 4,400 *edible* calories, about 125 to 135 grams of protein, and equally liberal allowances of other nutrients. During these surveys, the food prepared at the Army messes was always above the recommended Army minimum allowance of 3,600 calories.

The effect of environmental temperature is relatively small compared to that of physical activity. This has long been known and appreciated by nutritionists. On the basis of surveys made in tropical, temperate, and arctic environments, Johnson and Kark [7] concluded that the requirements for soldiers varied inversely with the mean temperature. On the other hand, Rodahl [8] noted no significant change in the year-round food consumption of troops adequately clothed and stationed in Alaska.

Murlin and Hildebrandt [9] in World War I, and Howe and Berryman [10] in World War II, noted a maximal seasonal difference of about 400 calories of food consumed in the mess. Johnson and Kark [7] believe that the "hobbling" effect of clothing contributes to increased caloric requirements in the arctic. This was confirmed by Gray, Consolazio and Kark,[11] who, in addition, noted a rise of about 2 percent in the oxygen consumption during identical work on the treadmill, due to temperature differences between "desert" and "temperate" environment, and a further rise of about 2 percent between a "temperate" and "arctic" environment.

In order to rule out the possible influences of extremes of climatic temperature, all of the studies were made during seasons of temperate weather. The units to be surveyed were chosen in cooperation and concurrence with the local command. At the beginning, the company commander was fully informed of the purposes and methods to be used. It was repeatedly emphasized that the survey team did not intend to interfere in any way whatsoever with the management of the mess or the methods of preparation or serving of the food.

EXPERIMENTAL PROCEDURE

Chemical analyses for protein, fat, moisture, and ash were performed on the food composites, carbohydrate being calculated by difference. The chemical method for measuring food consumption was used because by experience it was found to be the most reliable of the survey methods. Its accuracy and reliability depend upon (a) accurately weighing all the prepared foods coming to the serving line and all the discarded food from the trays, (b) obtaining an accurate head count at each meal, (c) preparing representative food composites, and (d) performing careful chemical analyses on the food composites and losses.

It is generally acknowledged that a considerable quantity of food is consumed by military personnel outside the Army mess. Preliminary investigations showed that this consumption is approximately 20 percent of the total food consumed from all sources. As a consequence, it was necessary to obtain an accurate record of the amount and type of food consumed in this manner. This was accomplished by means of a questionnaire, which listed all the popular foods, ranging from such items as alcoholic beverages, peanuts, milk, and ice cream to a complete meal. Food consumption was then determined at the end of the survey period by converting the totals in the questionnaire to calories using the standard tables of food composition.[12]

Body weights were taken to the nearest 0.1 kg in a nude state before breakfast, after voiding, prior to the beginning of the test, and at weekly intervals thereafter.

RESULTS

The average daily caloric intake from the Army mess alone (table 2) for the four training camps averaged 3,538 calories per man per day. The protein consumption averaged 114.7 grams and the fat intake averaged 170.4 grams. The energy content of the food consumed between meals at the mess ranged from 41 to 49 calories per man per day, averaging 44 calories.

The data for food eaten outside the Army mess also are presented in table 2. The total calories consumed averaged 727 per man per day, the distribution of nutrients being 15.8 grams of protein, 30.6 grams of fat, and 98.6 grams of carbohydrate per man per day. This source of food accounted for 17.0 per cent of the total food consumption. The total nutrients consumed from all sources (table 2) included the food consumed in the Army mess at meal times, the food consumed in the mess between meals, and the food consumed from all sources outside the Army mess. These values averaged 4,265 calories per man per day, with an average nutrient composition of 130.5 grams of protein, 201.0 grams of fat and 485.3 grams of carbohydrate.

The percent distribution of protein, fat and carbohydrate calories at all Army camps is presented in table 2. Protein accounted for 12.2 percent, fat for 42.4 percent and carbohydrate for 45.4 percent of the total calories consumed. The energy requirements of the soldiers at the various camps were computed on the basis of the total food consumption from all sources, with an adjustment for the caloric equivalent of the gain or loss of body weight during the entire survey period. The caloric equivalent of the changes in body weight aver-

Table 2. ***Nutrient consumption per man per day at 4 Army messes****

Camp	Days of survey	Head count	Calories	Protein (grams)	Fat (grams)	Carbohydrate (grams)
Camp Pickett	20	222	3,154	104.1	136.3	377.7
Fort Riley	20	227	3,457	116.5	163.8	378.5
Fort Benning	30	286	3,487	111.3	170.1	377.8
Fort Ord	30	226	3,908	124.8	197.2	409.2
Weighted averages, 4 training camps		231	3,538	114.7	170.4	386.7
Percent of total calories			100	13.0	43.3	43.7
Food consumed from outside sources (PX's, etc.)*						
Camp Pickett			613	11.9	27.6	79.3
Fort Riley			691	13.2	26.5	104.2
Fort Benning			731	16.5	31.0	92.1
Fort Ord			821	19.0	34.5	110.4
Weighted averages, 4 training camps			727	15.8	30.6	98.6
Percent of total calories			100	8.6	37.6	53.8
Average total food consumption per man per day from all sources						
Camp Pickett			3,767	116.0	164.0	457.0
Fort Riley			4,148	129.7	190.3	482.7
Fort Benning			4,218	127.8	201.1	469.9
Fort Ord			4,729	143.8	231.7	519.6
Weighted averages, 4 training camps			4,265	130.5	201.0	485.3
Percent of total calories			100	12.2	42.4	45.4

*Caloric and nutrient values calculated from standard tables of food composition. The consumption from outside sources included food eaten at the post exchanges, snack bars, vending machines, food from home, etc.

aged −69 at Camp Pickett, −196 at Fort Riley, −524 at Fort Ord, and +9 calories per man per day at Fort Benning (table 3). The calculated average caloric requirement for weight maintenance was 3,698 at Camp Pickett, 3,952 at Fort Riley, 4,179 at Fort Ord, and 4,227 calories per man per day at Fort Benning.

DISCUSSION

In previous studies from this laboratory it was noted that a considerable quantity of food from outside sources was consumed by the troops. An average of 727 calories per man per day, or 17.0 percent, of the total food consumed from all sources was obtained outside the mess. These values were considerably higher than those for food purchased in Army canteens in 1919,[9] which averaged 365 calories;

and were higher than the 400 calories per man per day reported by McCay and co-workers,[13-17] on food eaten by naval personnel at the ship's canteen. The data presented by Widdowson, Edholm and McCance[18] on English cadets in training averaged 1,178 calories per man per day for food eaten at the canteens.

It has been noted that this outside food consumption is a normal practice regardless of the quality of the food prepared in the Army

Table 3. ***Changes in body weights, caloric intake equivalent, and energy requirements at 4 Army camps****

Camp and company	Time between initial and final weights	Body weights			Average gain or loss per day	Caloric equivalent ** of weight change	Energy requirements
		Initial	Final	Gain or loss			
Camp Pickett	*days*	*kg*	*kg*	*kg*	*gms*		
Co. A	29	69.1	69.3	+0.2	+6.9	−47	3,772
Co. B	28	70.2	70.6	+0.4	+14.3	−97	3,620
Average						−69	3,698
Fort Riley							
Co. E	33	68.4	69.3	+0.9	+27.3	−185	4,206
Co. I	33	69.2	70.2	+1.0	+30.3	−206	3,771
Average						−196	3,952
Fort Ord							
Co. C	9	69.4	70.3	+0.9	+100.0	−680	4,065
Co. I	10	68.9	69.9	+1.0	+100.0	−680	4,054
Co. M	10	70.4	70.8	+0.4	+40.0	−272	4,393
Average						−524	4,179
Fort Benning							
1st cycle	21	68.8	68.4	−0.4	−19.0	+129	4,227
2nd cycle	18	68.0	68.3	+0.3	+16.7	−113	4,203
Average						+9	4,227

*Body weights were not determined in the surveys at Fort Sheridan, USAH Fort Riley, and USAH Fort Belvoir.

**Based on an assumed equivalent of 6.18 calories per gram of body weight change, plus 10 percent allowance for specific dynamic action.

mess facilities and may be attributed to a form of social eating and relaxation for the troops.

Outside eating places create a complex feeding problem for the mess personnel and may actually contribute to an increase in the food losses at the mess. The food service personnel have two alternatives: (1) to cut down on the total available food issued to compensate for food eaten outside the mess, or (2) to eliminate snack bars and vending machines from the immediate company area and, as a result, in-

crease the food consumption at the mess. The elimination of snack bars and other eating places is not desirable, because in our opinion they are a great factor in maintaining morale.

The total food consumption from all sources for the four training camps averaged 4,265 calories and 130.5 grams of protein per man per day. These values were well above the minimal daily recommended allowances of 3,600 calories and 100 grams of protein prescribed by regulations for physically active young men, but one must keep in mind that 727 calories per man per day are not being furnished from the Army mess. There is no question that the Army food service must offer the minimum caloric allowance, but it cannot expect all the food to be eaten at all times, because outside-the-mess eating will provide part of the requirement (except under combat situations).

Fat-Calorie Ratios

The data presented in the Fort Benning report,[4] by Rodahl,[8] Schwerin,[19] and Howe and Berryman [10] indicate that the American soldier is consuming a large percentage of his calories in the form of fat (between 35 to 47 percent). The available calories from fat are extremely high in comparison to other countries, but one must remember that American food habits have changed considerably during the past 25 years, especially with respect to deep fat frying of many of our foods. The National Research Council [6] does not prescribe any human requirements for the available fat calories in the diet; and since little or no data are available in the literature, one must assume that this quantity of fat is sufficient to maintain normal health. Sargent and associates,[20] and Elvehjem and Krehl,[21] are in agreement that the ideal fat consumption should be approximately 33 percent of the total average energy consumption.

We shall not attempt to document the present controversy as to whether a high-fat diet is an etiologic factor in atherogenesis, since no one at the present time can safely state whether an increased fat-calorie ratio in the diet is beneficial or detrimental to humans. One must always keep in mind that dietary fat is valuable as a concentrated source of calories, for the palatability and satiety it lends to a diet, and as a source of essential fatty acids. [21]

The Energy Requirement of the Soldier

As mentioned earlier, the energy requirements were computed by adjusting the food consumption for the changes in body weight. The conversion from grams of body weight lost or gained is based on the

assumption that one gram of body weight change is equivalent to an intake of 6.18 calories plus 10 percent for specific dynamic action.[22]

The caloric intake, adjusted for changes in body weight, of 3,698 at Camp Pickett, 3,952 at Fort Riley, 4,179 at Ford Ord, and 4,227 at Fort Benning (table 3), was still considerably higher than the 3,600 calories prescribed in AR 40–564 for physically active men. It must be considered that these troops, who were within the teenage group, were engaged in strenuous basic and airborne training and, as a result, required a large caloric consumption for growth purposes and also for the added energy expenditure. The Food and Nutrition Board of the National Research Council [6] recommends nutrient intakes of 3,750 and 4,000 calories per man per day for the upper levels of heavy activity for men aged 25 years and with weights of 65 kg and 70 kg, respectively. This is in line with the prescribed allowance of the British Medical Association, which recommends a caloric intake of 3,500 calories for men performing heavy work and 4,250 calories for men performing very heavy work. The Food and Agricultural Organization report on calorie requirements [23] states that "in a large population the number of persons engaged in work demanding 4,000 calories is relatively small (only loggers and coal diggers)."

The high caloric intakes in this study (3,700 to 4,260 calories) correspond to a high energy expenditure level of 4.0 to 5.0 calories per minute for at least 8 hours a day, which results in a daily expenditure between 3,800 to 4,300* calories. This probably represents the upper limit of daily energy expenditure that can be maintained regularly in heavy industry. Lehmann [24] and Müller [25] state that 5 calories per minute level (8 hours per day=2,400 cal.) is called the "endurance limit" and represents the approximate upper limit, without increasing the lactic acid or body temperature, that a man can normally maintain 6 days a week, week after week and year after year.

These corrected caloric requirements of troops in training are higher than the basic minimal requirements of 3,600 calories in AR 40–564 for physically active troops. On the basis of the work of Lehmann,[24] Müller,[25] and Passmore and Durnin,[26] these trainees should be classified in the same group as mountain troops on maneuvers, performing strenuous activities, and as a result should require an increased caloric intake above 3,600.

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*According to Passmore and Durnin,[26] 8 hours in bed is equivalent to 500 calories expended, and 8 hours spent away from work is equivalent to 1,400 calories more.

SUMMARY

During the past 4 years, four nutrition surveys were performed in Army camps: (1) on two basic training companies at Camp Pickett, Va.; (2) on two basic training companies at Fort Riley, Kans.; (3) on three basic training units at Fort Ord, Calif.; and (4) on two training cycles of airborne trainees at Fort Benning, Ga. The total food consumption corrected for body weight changes from all sources averaged 3,698, 3,952, 4,179 and 4,227 calories at Camp Pickett, Fort Riley, Fort Ord, and Fort Benning, respectively. This included 727 calories per man per day from sources outside the mess. The fat consumption of the 4 training companies averaged 42.4 percent of the total calories consumed.

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Liver Embolism to the Lung as a Complication of Trauma

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PULMONARY EMBOLISM produced by fragments of liver tissue is a very unusual finding in autopsy material. The presence of particles of intact hepatic tissue in pulmonary arteries has in every instance been a complication of trauma to the liver. This finding should not be confused with that of liver-cell emboli in pulmonary capillaries, which may occur in liver damage unrelated to trauma.

The first description of liver-tissue embolism to the pulmonary arteries was made by Jurgens [1] in 1886 and independently by von Recklinghausen [2] in the same year. In each of their cases gross hepatic tissue was seen in the pulmonary artery and was a complication of severe liver trauma. Two years later, Schmorl [3] performed an autopsy on a man who had been crushed between the bumpers of a train. He was impressed by the presence of gross liver tissue in the pulmonary artery. He considered it such a rare finding that he reviewed the writings of Jurgens and von Recklinghausen and reported two similar cases of his own. In the same year Zenker [4] described the distribution of gross liver tissue in smaller pulmonary arteries in the case of a gunshot wound of the liver. No further observations are recorded until 1935, when Willer [5] evaluated all the previous medical literature and reported a case in which he found gross liver embolism in the pulmonary artery as a complication of severe liver trauma. Straus [6] performed an interesting research study in 1942 on a large series of coroners' cases. He systematically reviewed all the lung tissue from 104 autopsies in which the liver was the site of mild to severe injury, and screened the material primarily for hepatic emboli. From this group he selected 40 severely lacerated livers and prepared many lung sections for study. This material resulted in finding one case with microscopic liver tissue in the pulmonary arteries.

During World War II, Lippincott and Breck [7] reported a very unusual case of a 27-year-old white man who was accidentally crushed by a military truck. The case revealed complete occlusion of the

From Armed Forces Institute of Pathology, Washington, D.C.

main pulmonary artery by a large fragment of macerated liver tissue, in association with rupture of the liver and laceration of the inferior vena cava. In 1957 Rezek and Willard [8] reported a case of a 15-year-old girl who died 3 hours after an automobile accident from multiple ruptures of the liver. Microscopic study of the lung revealed the plugging of a small pulmonary artery by a fragment of normal liver tissue. Studies made by Hickey and Stembridge [9] on a series of 236 aircraft accidents added 2 more cases of microscopic liver tissue in the pulmonary artery. Both cases represented a most severe form of body injury.

The purpose of this article is to report on the frequency of liver tisssue emboli occurring in autopsy material routinely reviewed by the forensic pathology section of the Armed Forces Institute of Pathology (AFIP). A series of 1,310 autopsies, restricted to traumatic deaths from vehicle accidents, falls from heights, and crush injuries, was examined. Only routine lung sections were screened. From this group, 287 cases were found to have mild to severe liver injury, but only 6 of these (cases 1 through 6) had microscopic fragments of liver tissue in pulmonary arteries. Four others (cases 7 through 10), unrelated to this review but found in the files of the AFIP, are included.

CASE REPORTS

CASE 1. Auto accident (AFIP Acc. No. 705384). A 24-year-old white man was involved in a two-car collision. He died en route to the hospital. At autopsy, the liver, spleen, and both lungs were found to be severely lacerated. Multiple fractures were found in the skull, sternum, and ribs. Microscopic examination revealed an intact fragment of liver tissue lodged in a small pulmonary artery. The liver showed a moderate degree of fatty metamorphosis, which also was evident in the hepatic embolus.

CASE 2. Auto accident (AFIP Acc. No. 732460). A 17-year-old white youth was thrown from his car when it hit a bridge. He died 5 minutes after admission to the hospital. At autopsy, seven deep lacerations were noted in the right lobe of the liver. The parietal pericardium was avulsed, and the left fifth rib was fractured. Microscopic study of the lung showed an intact fragment of liver tissue surrounded by red blood cells in the lumen of a small pulmonary artery.

CASE 3. Blow from cable and fall from height (AFIP Acc. No. 783935). A young male mechanic was struck across the chest by a heavy cable. The force carried him headfirst into a 10-foot pit. Death was immediate. At autopsy, the liver and spleen were found to be ruptured. The liver weighed 800 grams and consisted of a pulpy, macerated mass of tissue. The skull, ribs, and the ulnas and radiuses of both arms had been fractured. Microscopic examination of the lung revealed an intact fragment of liver tissue which distended the lumen of a small pulmonary artery (fig. 1).

CASE 4. Auto accident (AFIP Acc. No. 812181). A 21-year-old Negro man was in a head-on collision between a car and a tractor-trailer gasoline truck. He survived 50 minutes after the accident. Autopsy showed the liver and spleen to be ruptured. The liver had severe maceration of both lobes. Multiple fractures were present in the ribs and in the bones of the lower extremities. Microscopic study of lung tissue showed fragments of liver tissue in several pulmonary arteries. In one arteriole the liver fragment was very small (fig. 2). In a larger vessel the particle was positioned as a saddle-type embolus (fig. 3).

CASE 5. Auto accident—pedestrian (AFIP Acc. No. 678678). A 5-year-old white boy was struck by a civilian vehicle on a military base. He survived 2

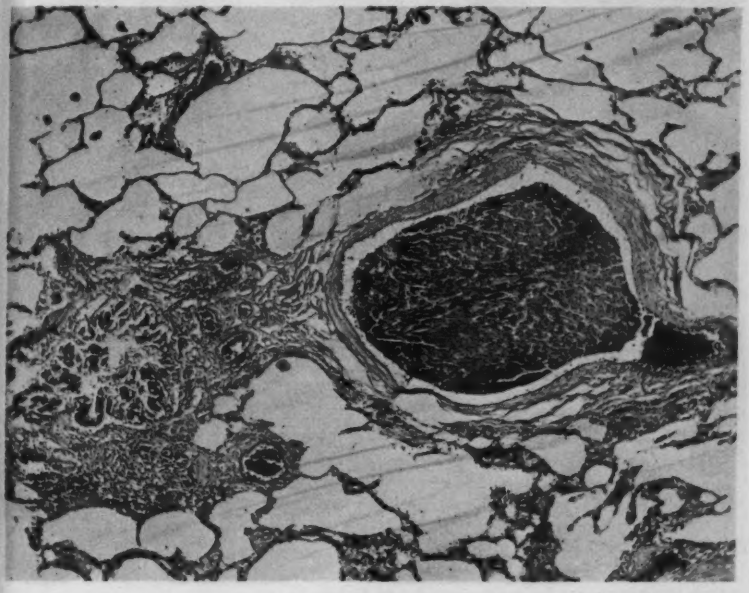

Figure 1 (case 3). Small particle of well-preserved liver tissue in a pulmonary artery (Armed Forces Institute of Pathology negative 57–5522–1). (Hematoxylin and eosin stain, x 50)

days after the accident. At autopsy, both the liver and spleen were found to be ruptured. Microscopic examination of the lung revealed a large fragment of liver in a medium-sized pulmonary artery. The wall of the vessel was markedly distended, and the liver cells were very much compressed and seemed contoured to the lumen of the vessel (fig. 4).

CASE 6. Truck accident (AFIP Acc. No. 875804). This 19-year-old white youth jumped from a moving military truck. He was crushed beneath the vehicle. Death occurred soon after the accident. At autopsy the liver, spleen, and both adrenal glands were found to be ruptured. No fractures were found. Microscopic studies of lung tissue disclosed a large fragment of liver lodged in

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a medium-sized artery. Intact liver-lobule architecture was present, and portal spaces were easily seen (fig. 5). Both the still-intact liver tissue and the embolic fragment showed a moderate fatty metamorphosis.

CASE 7. Truck accident (AFIP Acc. No. 165774). A young white man was crushed beneath a military truck during World War II. He expired 7 days after injury despite surgical repair of a badly lacerated liver. At autopsy the liver showed evidence of repair of several lacerations, with extensive hemorrhage and necrosis. The right adrenal was torn. The right kidney was infarcted over two thirds of its area, as a result of thrombosis of the right renal artery.

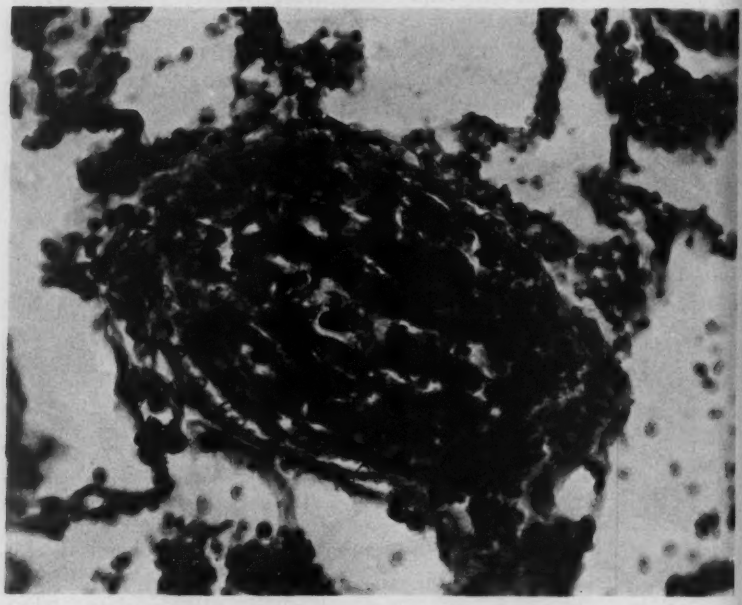

Figure 2 (case 4). Liver fragment distending a small arteriole (Armed Forces Institute of Pathology negative 57–5522–2). (Hematoxylin and eosin stain, x 375)

Microscopic examination of the lung revealed a fragment of intact liver tissue blocking a dilated secondary pulmonary artery near its bifurcation. Within the mass of liver tissue were liver cells containing brown pigment granules in the cytoplasm. No mitosis was noted. The mass of hepatic cells was not attached to the endothelial layer of the vessel, and there was marked thinning of the artery wall.

CASE 8. Automobile accident (AFIP Acc. No. 176929). A 19-year-old white youth was killed instantly in an auto accident. At autopsy the liver and spleen showed severe laceration. Multiple fractures of the skull, mandible, maxilla, right ulna and radius, several ribs, and both clavicles were found. Micro-

scopic study of the lungs showed a dumbbell-shaped fragment of intact normal-appearing liver cells in a medium-sized pulmonary artery.

CASE 9. Gunshot wound of abdomen (AFIP Acc. No. 711413). A 21-year-old white man accidentally shot himself in the lower abdomen with a 22-caliber long rifle missile. At laparotomy perforations of the intestine, liver, diaphragm, and right lung were found. Death occurred from a subacute peritonitis on the 49th day after the shooting. Microscopic examination of the lung showed a fragment of necrotic liver tissue within a medium-sized pulmonary artery

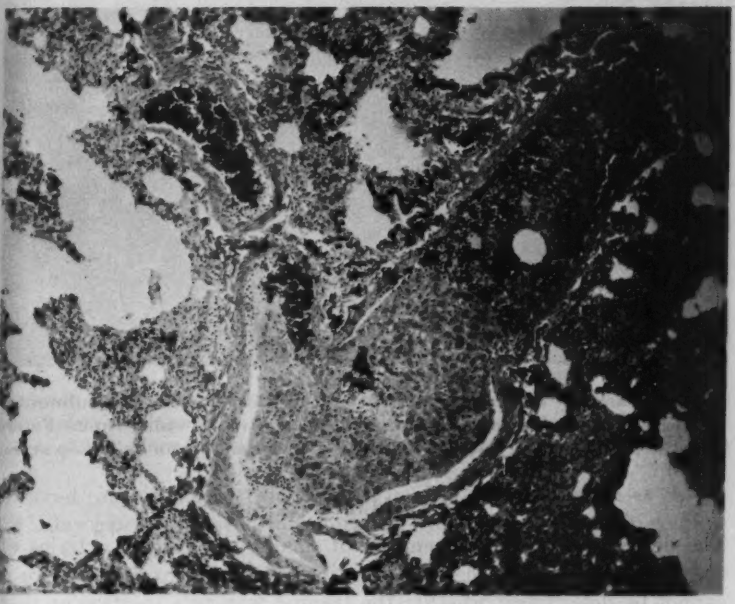

Figure 3 (case 4). Liver fragment at the bifurcation of a pulmonary artery acting as a saddle embolus (Armed Forces Institute of Pathology negative 57-5522-3). (Hematoxylin and eosin stain, x 60)

(fig. 6). No intact liver cells were detected in the center of the mass, which was occupied by phagocytes containing brown pigment granules. The periphery of the mass revealed intact liver cells. One surface of the liver fragment appeared to be attached to the endothelial surface of the artery.

CASE 10. Automobile accident (AFIP Acc. No. 734465). A 28-year-old white pregnant woman was involved in an automobile accident. Survival time is not known, but she was dead on arrival at the hospital some 2 hours after the accident. Autopsy revealed several lacerations of the liver and spleen. Microscopic examination of the lung showed an intact fragment of liver tissue in a medium-sized pulmonary artery. In addition, several of the pulmonary arteries had emboli of amniotic fluid.

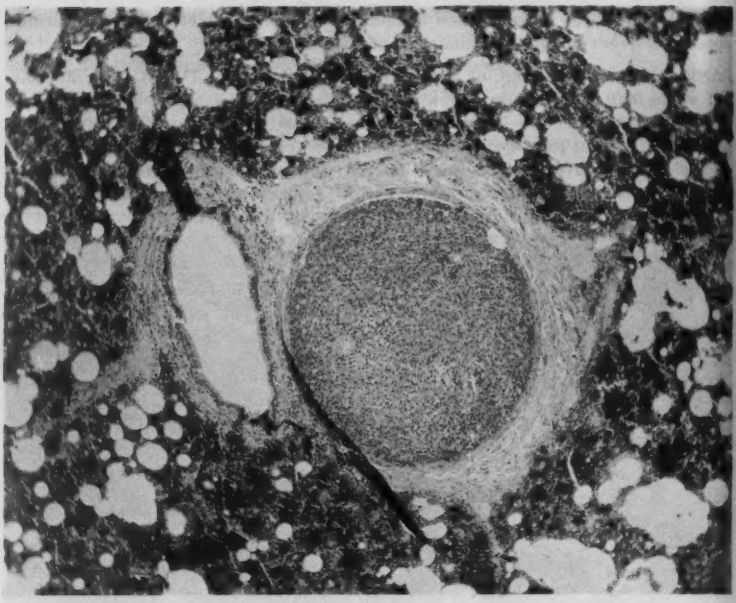

Figure 4 (case 5). Large fragment of compressed liver tissue in a pulmonary artery, producing a marked distension of the vessel wall (Armed Forces Institute of Pathology negative 57–5522–4). (Hematoxylin and eosin stain, x 35)

COMMENT

The detection of liver-cell emboli in smaller pulmonary arteries of the lung has a medicolegal application, especially in cases where it cannot be determined whether the trauma was ante mortem or post mortem. In order for a fragment of hepatic tissue to be pumped into the pulmonary circulation, life must be sustained at least momentarily. Of the 10 cases in this report, 3 died almost immediately of trauma, and the longest survival was 49 days.

The fate of the smaller pulmonary liver-fragment emboli in man is still unsolved. Usually the trauma itself is severe enough to cause death. Experimental work on animals, using intravenous injections of fine particles of embryonic liver tissue, was done by Lengemann.[10] He used rabbits, dogs, and cats as his experimental animals. After the first day, he found some active mitoses in the large masses of liver cells along with areas of early degeneration. Ten days after injection, only residual outlines of the cells were observed. From 15 days and beyond, the embolus showed evidence of organization and

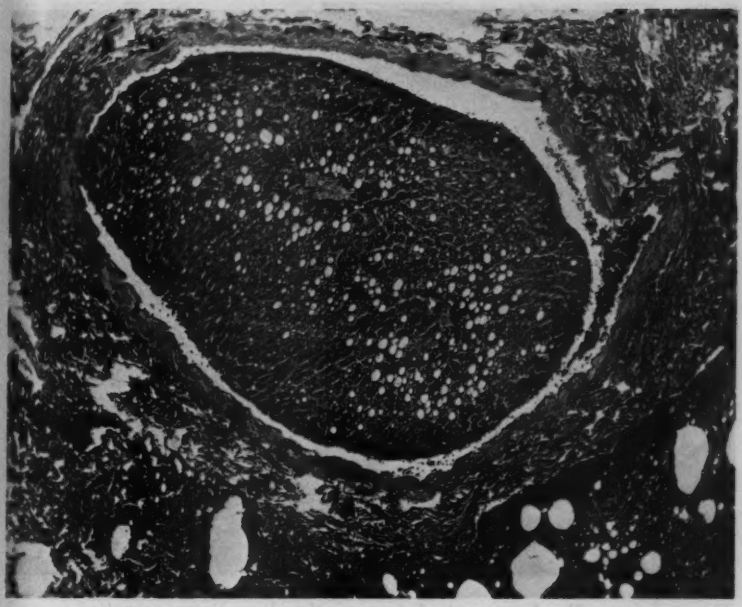

Figure 5 (case 6). Large fragment of liver tissue, showing fatty metamorphosis and good lobule pattern, in a larger pulmonary artery (Armed Forces Institute of Pathology negative 57–5522–5). (Hematoxylin and eosin stain, x 55)

adhered to a markedly thickened intimal layer. The arteries on the 27th day gave no evidence of alteration except for residual thickening of the intimal layer.

Two patients in this report had a survival period of a week or more. The patient in case 7 lived 7 days after the accident, and the liver cells within the fragment were well preserved. However, there was an added feature—in the center of the fragment were liver cells containing pigment granules. Case 9, in which the patient survived for 49 days, is most unusual; and the findings differ from those in the experimental studies of Lengemann in that the peripheral liver cells were still intact after this length of time. Only the center of the fragment had unrecognizable liver cells. In addition, a portion of the fragment was firmly adherent to the vessel wall. This would indicate that the liver fragment may eventually appear as a hyalinized thrombus within the occluded pulmonary artery.

Case 10 is of interest in that the pulmonary arteries contained both amniotic-fluid emboli and a liver-tissue embolus.

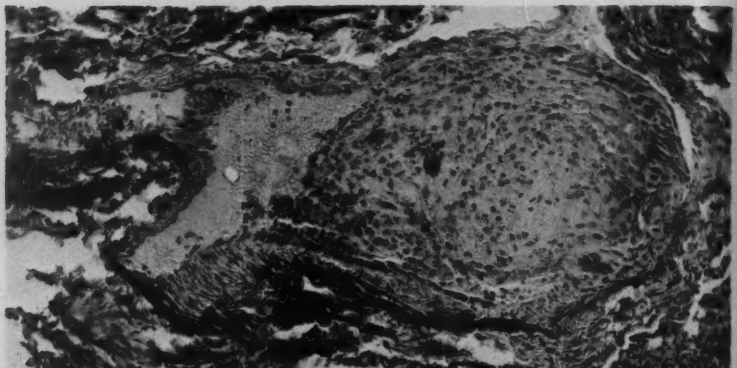

Figure 6 (case 9). Fragment of degenerating liver tissue attached to wall of the pulmonary artery. Note the preservation of peripheral cord cells. (Armed Forces Institute of Pathology negative 59–691). (Hematoxylin and eosin stain, x 145)

All cases reported in the literature of embolism of fragments of hepatic tissue to pulmonary arteries were a complication of either blunt trauma or gunshot wounds to the liver. The 10 cases described in this report are also in this etiologic category.

The distinction must be made between segments of liver-tissue emboli that appear in pulmonary arteries and the individual liver-cell emboli that are frequently observed in pulmonary capillaries. Jurgens [1] first described the finding of liver-cell emboli in pulmonary capillaries in an autopsy on a patient who had died from eclampsia. Karsner [11] also noted that cord cells of the liver may lodge in pulmonary capillaries as a result of hepatic necrosis.

SUMMARY

Previous reports of liver embolism to the lung in the medical literature are reviewed. Fewer than 15 cases of liver-tissue embolus in the lung, all of which resulted from severe trauma, have been reported. Ten additional cases are presented in this review. Six of the 10

cases of pulmonary hepatic-*tissue* embolism were found on microscopic examination of routine lung sections from 1,310 medicolegal-type autopsies. All 6 of these came from a group of 287 cases that had liver trauma. The other 4 were also associated with severe liver trauma but were coded cases from the autopsy files.

The finding of fragments of liver tissue in pulmonary arteries is universally associated with liver trauma. In contrast, liver-*cell* embolism to the pulmonary capillaries may occur following liver damage unrelated to trauma.

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Clinical Aspects of Chronic Subdural Hematoma

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CHRONIC SUBDURAL HEMATOMA in adults is an entity which gives rise to considerable confusion as to diagnosis and regarding which there has been a great deal of argument concerning etiology and pathogenesis. Whereas the causal relationship between head trauma and acute subdural hematoma is clearly evident, trauma may be slight or inapparent in many cases of chronic subdural hematoma. Some cases are stated to have occurred as the result of "spontaneous" hemorrhage,[1, 2] but trauma of some degree is practically always responsible.[3-5] Peet[6] states: "As a rule the injury is comparatively mild, in fact in many cases so slight as to have been entirely forgotten until careful questioning recalled the occurrence." A small number of cases not due to trauma can be directly related to a variety of rare causes, including ruptured aneurysms,[7-10] blood dyscrasias, metastatic or primary neoplasms,[11] and thrombosis of cerebral veins or dural sinuses.[12-15]

The clinical picture of chronic subdural hematoma is extremely varied, and consequently, unless a high index of suspicion is maintained, the diagnosis can frequently be missed. The importance of making the diagnosis from clinical findings and of performing exploratory trephination to confirm it cannot be overstressed.[16, 17]

Chronic subdural hematoma occurs most frequently between the ages of 40 and 70 years; probably the greatest incidence lies in the sixth decade.[6, 18] The majority of cases have been said to occur in men, possibly as the result of a greater liability to head trauma. Although chronic subdural hematomas do occur in young adults, children, and infants, the etiologic trauma in such cases is usually obvious and severe in contrast to their occurrence in older age groups. So-called spontaneous nontraumatic subdural hematoma developing earlier than the fourth decade has apparently not been reported.

The clinical picture may vary greatly with the duration of the hema-

From Armed Forces Institute of Pathology, Washington, D.C.

toma and with its size and origin. Although the usual location of the clot is over the superior aspect of the cerebral hemispheres, a lateral or inferior position and extension to the base are not uncommon.[10] Further difficulty in diagnosis occurs because the latent period between the original trauma and the occurrence of symptoms can be extremely variable. Munro [19] states that the latent period may vary up to years while Voris [10] feels that the maximum is 3 months.

Headache, the symptom most usually present, characteristically will vary considerably during the course of the illness. Often it is mild and has no apparent relationship to the location of the hemorrhage itself. Nausea and vomiting may occur in some patients and most usually are associated with an exacerbation of headache. Drowsiness is frequently present and like the headache tends to vary in its severity during the course of the illness. Patients may become comatose and then recover completely only to have a repetition of the episode in a few days. The drowsiness may coincide with increased severity of the headache, or may be unaccompanied by headache. Some individuals suddenly increase their hours of sleep markedly and may be observed to lack ambition and be given to napping during the day. Subtle or marked changes in personality may occur, in some patients so slight initially that they go unnoticed by the family and are first observed by an employer or business associate. In some patients with severe mental changes, the diagnosis of senile dementia or of severe depression may be made. Naturally, many of these patients are first seen by a psychiatrist, and unless the true nature of the condition is recognized they may be considered insane and committed to psychiatric hospitals. Delusion of the body scheme due to the presence of a subdural hematoma has been reported by Halloran.[20] Convulsions as a symptom of chronic subdural hematoma, although uncommon, may occur. They are usually jacksonian or generalized, but temporal lobe seizures in chronic subdural hematoma have been reported and marked clinical improvement followed surgical intervention.[21]

On neurologic examination of patients with chronic subdural hemorrhage the findings are often extremely meager. Lateralizing signs may be completely absent or may consist only of sight weakness and slight increase in deep muscle reflexes. Occasionally these findings will be on the same side as the lesion and are apparently produced by displacement of the brain by the hematoma with resultant pressure on the opposite cerebral peduncle. The lesion itself may produce no symptoms through pressure on the underlying cortex, since presumably it develops slowly and does not actually involve the cortex. As symptoms vary during the illness, so may neurologic findings.

Funduscopic examination may disclose evidence of increased intracranial pressure as manifested by papilledema, usually of minor degree, with blurring of the disc margins and absence of venous pulsations. Small retinal hemorrhages may sometimes be present. The pupils are occasionally unequal with the dilated pupil most often occurring on the side of the lesion. In those cases in which the pupillary dilatation occurs on the side opposite the hematoma, contralateral herniation of the uncus is probably responsible. As in other cases of space-occupying lesions, involvement of the sixth cranial nerve may occur, which is also of no localizing value here. Nystagmus and gaze palsies, presumably the result of formation of a temporal lobe pressure cone, have been reported by Nelson,[22] who feels that the presence of signs of brain stem involvement should not contraindicate surgery when other clinical findings warrant the diagnosis of subdural hematoma. Strict localization, actually, is neither particularly necessary nor indicated if the diagnosis has been made, since the high incidence of bilateral hematomas makes adequate multiple bilateral trephinations essential.

Routine laboratory studies are of no special diagnostic value but lumbar puncture may be of some assistance in making the diagnosis. Pressure may be elevated, although not often above 300 mm of water, but may also be normal or below normal. Protein is usually increased and occasionally the fluid may be frankly xanthochromic.

Difficulty in making the diagnosis of subdural hematoma because of the inconstant and often contradictory symptomatology has led to a constant search for improved diagnostic adjuncts. Roentgenograms of the skull may reveal calcification in the membrane of the hematoma or a shift of a calcified pineal gland. Ventriculography and arteriography are often helpful but are not a substitute for accurate clinical judgment. The roentgenographic findings in both procedures are usually readily interpreted and are pathognomonic in the case of arteriography. A specific angiographic pattern of an avascular space adjacent to the cranial vault is seen, and in unilateral cases, shift of the anterior cerebral artery to the opposite side is usually present.[23] The characteristic pattern is seen in anteroposterior views of the arterial phase; lateral views are usually of no diagnostic value. Ventriculograms will show evidence of a space-occupying lesion, but in some cases specific conclusions cannot be drawn. If exploratory trephination to confirm clinical suspicion has not already been done, the procedure of making the bur holes for ventriculography may, in some cases, disclose the hematoma.[10]

Inasmuch as all of the radiologic contrast procedures entail a

certain degree of risk not shared by electroencephalography, there has been sustained interest in the improvement of the latter technic in the diagnosis of subdural hematoma.[24-26] Despite the fact that some subdural hematomas produce a diagnostic picture, the EEG findings are extremely variable and in some cases even a normal record may be found. In the EEG study of chronic subdural hematoma in experimental animals, Cohn[27] found three types of record, essentially the same types as those noted clinically: (1) focal decreased activity (reduced amplitude) over the site of the hematoma; (2) generalized slow waves with a focus of maximum abnormality over the "hemorrhage" or immediately adjacent areas; and (3) an essentially normal recording in a few cases.

The following cases are presented as examples illustrating the clinical findings in chronic subdural hematoma:

CASE REPORTS

CASE 1. A. K., a 60-year-old white man, began to experience a constant, mild generalized headache 3 weeks prior to admission. Ten days prior to admission he had complained of severe frontal headache and remained home from work. His family noted a marked personality change; the patient was severely depressed and inattentive, and spoke only occasionally. Slight improvement was noted twice, but each time the depression and confusion returned. On three occasions the patient was incontinent of urine. There was no history of trauma to the head, and he was not known to be hypertensive.

The blood pressure was 120/80 mm Hg. Examination of the mental status revealed poor recent and remote memory and poor response to questioning. Cranial nerve examination revealed a right supranuclear facial paresis. Sensory examination disclosed bilateral impairment of stereognosis but loss of no other modality. Motor power, muscle tone, and coordination appeared to be normal. The deep muscle reflexes were active and equal throughout. There was no Hoffmann response in either hand, but the plantar response on the right was dorsiflexion.

A complete blood count was within normal limits. A spinal tap revealed normal pressure, and laboratory studies were normal. A 7 mm shift of the pineal to the right was seen on the skull films and an electroencephalogram was interpreted as indicative of an extensive lesion in the left anterior quadrant, which was thought to be a neoplasm. The preoperative diagnosis was frontotemporoparietal glioma.

When trephination was performed over Keen's point on the left in preparation for a ventriculogram, a subdural hematoma was revealed. On subsequent exploration this hematoma was found to cover the entire hemisphere and to depress the brain about 2.5 cm. A smaller hematoma was also found on the right side. Following removal of the hematomas, the patient made an uneventful recovery and examination 2 months after operation disclosed no neurologic deficiency and no defect of memory or personality.

This patient presented a picture compatible with the diagnosis of an infiltrating brain tumor. At surgery, the discovery of a subdural

hematoma came as the sort of agreeable surprise noted by Biemond,[28] in whose series 8 of 15 cases of chronic subdural hematoma had been diagnosed preoperatively as cerebral tumor. No history of trauma was ever obtained in this patient, but as a truck maintenance mechanic he could have had ample opportunity for mild degrees of head trauma.

CASE 2. I. M., a 54-year-old white housewife, was apparently well until 10 days prior to admission, when she had a sudden onset of severe frontal headache, followed by several episodes of nausea and vomiting. She went to bed, and although the headache persisted, she felt much better and was up and about again 5 days after the onset of the symptoms. Two days later she again felt nauseated and vomited several times. The headache became more severe and again she went to bed. The day prior to her admission she became disoriented and then stuporous, and remained so except for one brief lucid period on the morning of admission. The patient had never previously complained of headaches, but she had been hypertensive for many years.

On admission the blood pressure was 180/105 mm Hg. The patient was stuporous but would occasionally respond to questions in a monosyllable. Examination of the cranial nerves was not remarkable, except for some slight blurring of the nasal portions of the optic discs and sluggish pupillary reaction to light. The patient responded to deep pain stimuli with withdrawal. Muscle tone was normal; the deep muscle reflexes were active and equal throughout. A Hoffmann sign was present on the left. There was no nuchal rigidity.

Her vital signs continued essentially as they had been on admission until, 12 hours after admission, her respirations suddenly ceased without warning. The clinical diagnosis was probable subarachnoid hemorrhage. Autopsy revealed a large subdural hematoma occupying the middle and anterior fossae of the left side of the skull.

This case is perhaps not strictly an example of chronic subdural hematoma but of a more acute form, which because of the diagnostic problems it presents should be considered in clinical evaluation. The possibility exists that this type of subdural hemorrhage is due to rupture of an aneurysm, but it was not proven in this case.

CASE 3. W. R. C., a 63-year-old white man, complained of severe memory impairment which had been present for about one year. He had also noticed some slurring of speech, occasional episodes of dizziness, and a pronounced loss of libido. His general health prior to the present illness was said to be excellent. There was no apparent history of trauma to the head and the patient was not known to be hypertensive.

The blood pressure was 138/82 mm Hg: the general physical examination was essentially within normal limits. Examination of mental status revealed the patient to be unable to give the day, the date, or the year. He was unable to write his name or address correctly and was unable to repeat even a short test phrase. He could not perform any simple calculations correctly. His speech was slow, but there was no true dysphasia. Cranial nerve examination was within normal limits except for some bilateral reduction in hearing. Sensory examination revealed no defect of any sensory modality. Muscle strength and tone were good. There was no ataxia, and tests of coordination were satis-

factory. Gait and station were not remarkable. Deep muscle reflexes were hypoactive but equal throughout. Hoffmann and Babinski signs were absent.

A complete blood count and urinalysis were within normal limits. Skull films were interpreted as normal. An ophthalmologic examination was normal except for some generalized constriction of the visual fields, which was thought to be the result of poor cooperation.

A diagnosis of severe organic brain syndrome, etiology unknown, was made and the patient was subsequently committed to a state mental hospital. After his death 5 years later, an autopsy revealed an old subdural hematoma covering the anterior portion of the left cerebral hemisphere. Histologic examination disclosed the hematoma to be edematous, calcified, and partially hyalinized.

Subsequent to the autopsy finding of a chronic subdural hematoma, repeated questioning of relatives revealed that the patient had sustained a dazing blow to the head in an automobile accident approximately three months prior to the onset of symptoms. It was the impression of the pathologist that the age of the lesion was such that the trauma at the time of the accident could well have been responsible.

CASE 4 C. R., a 35-year-old white man, had noticed headaches for 7 weeks prior to admission, chiefly in the occipital region, but at times frontal, mainly on the left side, and throbbing. At first they were not severe enough to make him quit work, but during the next 3 weeks he had to go home 2 days out of each week because of the headaches. Three weeks before he was seen the headaches had become very severe, and he had been home from work since that time. Three days before admission the headaches markedly improved. During the first week of his illness, the patient had two attacks in which he lost consciousness. After quitting his job he had tried to do a little work about the house, and in an hour became so fatigued that he had to sit down. He had not tried to do anything since then. During the first week of his illness, the patient had one episode of vomiting. For a week before he came to the hospital he had had difficulty in reading small print. At 17 years of age, a serologic test had been positive and he had received two 9-week courses of arsenical therapy.

The blood pressure was 118/75 mm Hg and the general physical examination was not remarkable. The funduscopic examination revealed early bilateral papilledema. There were no abnormalities of the cranial nerves. The only other finding of note was an equivocal plantar response on the left.

Three blood Kahn examinations were doubtful positives, but the spinal fluid Kahn was 4 plus and the spinal fluid protein was 67 mg per 100 ml. Spinal fluid pressure was not elevated. The EEG had a very good normal appearance without any atypical features.

A ventriculogram was attempted on the right side, and a typical chronic subdural hematoma was encountered, previously unsuspected. Subsequently, other trephinations were performed on the opposite side, but no other hematoma was found. The postoperative course was uneventful. The patient's headaches cleared up completely, and so did the papilledema. Five or six days following the drainage of the subdural hematoma, there was a slight flare-up in his condition in that he developed a few mild sensory jacksonian attacks in his left arm and face. Under anticonvulsant medication these did not occur again and the patient was discharged.

In this patient, who was below the general age range in which

chronic subdural hematoma usually occurs, the presence of a luetic infection is thought to be of considerable significance. The occurrence of a sensation of moderate to marked fatigue, as was noted in this man, is frequently noted by patients with chronic subdural hematoma. The finding of an essentially normal EEG record should not be interpreted as ruling out chronic subdural hematoma.

CASE 5. J. M., a 64-year-old white man, began to note severe headache involving the vertex and occipital region about 10 days prior to admission. He also began to note generalized weakness, marked fatigue, and difficulty in buttoning his clothes. His appetite had been poor during the present illness, but he had had no nausea or vomiting. His brother, with whom he lived, had noted that the patient had seemed confused and that he had been lethargic and drowsy.

The blood pressure was 190/110 mm Hg. The general physical examination revealed slight cardiomegaly and there were occasional extrasystoles. The abdomen was distended but no organs or masses were palpated. The patient was extremely slow in answering questions but followed simple commands and was oriented as to place and person. The neurologic examination revealed questionable mild weakness of the left hand and arm. The deep muscle reflexes were slightly greater on the left than on the right, and the plantar response was suggestively upward bilaterally. His gait was wide-based and uncertain.

The day following his admission he became less responsive and would no longer answer questions, although the vital signs remained stable. A spinal tap disclosed a pressure of 250 mm of water but the fluid was clear. Multiple trephinations were performed on the right side and an extensive subdural hematoma was encountered, which was removed together with the thickened membranes. Multiple trephinations were then performed on the left side, where a similar hematoma was found and removed. Subsequent questioning of a relative, who had not been available prior to surgery, revealed that the patient had struck his head on the arm of a chair one week prior to the onset of symptoms.

Operative intervention before the occurrence of marked alteration of vital signs is of particular importance in older patients. The prognosis is relatively good except where delay has caused the occurrence of complications such as thrombosis of the cortical veins. The brain then fails to re-expand, despite efforts to produce expansion, and the outcome is often fatal. With deterioration of the ability of this man to respond to questioning, it was felt essential that surgery be undertaken immediately and it was successfully carried out.

CASE 6. B. S., a 48-year-old white woman, had noticed blurring of vision for 3 months prior to admission and bilateral frontal headaches for 1 month. One week prior to admission the patient had a grand mal type of convulsion. No clinical localization could be made and on the way to another hospital the patient had three more such convulsions. She remained comatose for several hours and then gradually improved. She continued to improve until 3 days before admission, at which time she again gradually slipped into a coma.

On admission, the patient talked in an irrational manner, but showed no apparent motor or sensory change. Ophthalmoscopic examination did not show papilledema. A slight right central facial paresis was noted and the deep muscle reflexes were generally hypoactive.

An EEG was interpreted as showing an extensive lesion in the left hemisphere, possibly neoplastic, but it was thought that a vascular lesion could not be ruled out. A roentgenographic examination of the skull was normal. A ventriculogram revealed evidence of a left-sided space-occupying lesion in the frontoparietal region. Routine laboratory studies were within normal limits. The spinal fluid was slightly xanthochromic but under normal pressure.

The patient underwent a craniotomy with a preliminary diagnosis of left-sided brain tumor. When the dura was opened, a large subdural hematoma was found and evacuated. For the first three postoperative days the patient's course was rather stormy. The temperature was elevated to 105° F on several occasions and on the third postoperative day the patient had a right-sided convulsion. Following this her course continued to improve, she began talking in a rational manner, and her temperature diminished. She became progressively more alert and 3 weeks after the operation she was discharged.

Although this case differed from the others in the occurrence of several convulsions, the variation in severity of symptoms was noted as it was in the other cases. Repeated questioning revealed no history of head trauma except a blow to the head incurred in an automobile accident 15 years before, which had caused unconsciousness for several hours. This injury would not seem related to the subdural hematoma.

SUMMARY

The diagnosis of chronic subdural hematoma offers considerable difficulty because of the variability of symptoms and the latent period which exists between the occasion of trauma and the onset of symptoms. Although trauma can practically always be implicated as the causative agent, in some cases it is minimal and the history of trauma is elicited only in retrospect.

Six cases are presented to illustrate the clinical aspects of chronic subdural hematoma and to demonstrate possible errors of diagnosis. The importance of a high index of suspicion in making the diagnosis and of exploratory trephination to confirm it are emphasized.

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Acute Nonspecific Pericarditis

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ACUTE NONSPECIFIC PERICARDITIS appears to be occurring more frequently; at least it is being recognized more frequently. Reports [1, 2] indicate that the nonspecific variety is the most commonly encountered type of acute pericarditis in a general hospital.

In a 3-year period (1955–58), 23 cases of acute pericarditis were diagnosed at this hospital. This represents a higher incidence than that generally recorded. There have been 3 series in the literature containing a larger number, which were collected over a period of 5 to 10 years.[3-5] In 1951 Parker and Cooper [6] reported 22 cases from this hospital prior to the period of this current series. The cardinal diagnostic triad of pain, friction rub, and specific electrocardiographic change has been present in most of the reported cases. Sodeman and Smith,[1] on the other hand, have emphasized the importance of suggestive and nonspecific findings in making the diagnosis.

The criteria that have been used as a basis for case selection are absence of a specific cause and one or more of the following: (1) specific serial electrocardiographic changes (defined below); (2) pericardial friction rub; (3) typical chest pain with either: (a) nonspecific T changes in the electrocardiogram, or (b) transient enlargement of the heart shadow on x-ray.

CLINICAL DATA

The average age of the group was 36 years with a range from 12 to 67 years. Fourteen patients (60 percent) were 39 and over. Twelve (52 percent) of the cases occurred during the months of June, July, and August. Seven (30 percent) patients gave a history of a cold or sore throat preceding the onset of pericarditis by 5 to 14 days.

Twenty-two (96 percent) patients experienced chest pain which was usually described as substernal or diffuse (table 1). A few described left anterior chest pain, and there was one case each of right anterior chest, lower left sternal border, and interscapular pain. The character

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Table 1. ***Location of chest pain—22 patients***

Substernal	8	Right anterior	1
Diffuse precordial	8	Lower left sternal border	1
Left anterior	3	Interscapular	1

of the pain as described by the patient was "sharp," "stabbing," or "catching" in 9; "pressing," "squeezing," "tightness," or "heaviness" in 7; "dull," "aching," or "soreness" in 3; and not described in 3. In general, the onset was sudden in those having the sharp or pressure type of pain, and more insidious in those having an aching type of pain. The patient without pain was admitted with aseptic meningitis, and routine electrocardiographic examination showed specific changes with subsequent evolution. Pain was markedly aggravated by respiration or cough or both in 15 patients (68 percent). In 7 of these patients, there was also aggravation by movement of the trunk, and 1 patient described accentuation by movement but not by respiration. In the remaining patients, no mention was made of any accentuating factors. Radiation of pain was described by 16 patients, no mention being made in the other 6 (table 2). The most common sites for radia-

Table 2. ***Radiation of pain: incidence of sites in 22 patients***

Left shoulder and/or arm	5	Right flank	1
Both shoulders	5	Elbows	1
Neck and/or jaw	5	None	6
Right shoulder	1		

tion of the pain were the left shoulder and/or arm, both shoulders, and the neck and/or jaw. Pain radiated to the right flank in one case and to both elbows in another. In some patients, pain radiated to more than one of these sites.

Although some patients complained only of chest pain (and these were usually the milder cases with the shortest courses), the majority entered with associated symptoms (table 3). Malaise, with or without chills and fever, was the most common complaint. Five patients complained of dyspnea. Less common were headache, stiff neck, and arthralgia, with one patient each complaining of diarrhea and abdominal pain. The patient with abdominal pain was of interest in

Table 3. ***Incidence of associated presenting symptoms***

Malaise	6	Stiff neck	2
Chills and fever	5	Arthralgia	2
Dyspnea	5	Diarrhea	1
Headache	2	Abdominal pain	1

that he initially presented the picture of an acute surgical abdomen and was operated on for acute appendicitis.

PHYSICAL EXAMINATION

Only 2 patients were described as appearing acutely ill on admission by virtue of chest pain or associated symptoms or both. Seventeen (74 percent) were febrile, although in most cases this was low grade in the range of 100 to 101° F orally. Occasionally a peak temperature of 103° F orally was recorded. The neck veins were not described in most cases, but 5 patients, when inclined at least 30°, had prominent pulsations of the cervical veins above the clavicle. Hyperemia of the mucous membranes was present in 3 patients. Three patients had cervical lymphadenopathy. Rales were heard at the left lung base in 3 patients and at both bases in 2. In addition, there were 2 patients with signs of consolidation at the left base (one of whom had cardiac tamponade).

Only 8 patients (35 percent) had a pericardial friction rub, which was always to and fro in character. In 5 of these the rub was heard on admission, in 1 it was present 3 hours later, and in 2 it was heard between the third and fifth day of illness. Auscultation for a rub was repeatedly performed in many of the patients in whom none was heard. Of 2 patients with significant paradoxic pulse, 1 had acute tamponade. Abdominal tenderness and guarding were present in 4 patients.

LABORATORY STUDIES

The white blood count on admission was above 10,000 per cu mm in 14 patients (60 percent), with a range of 12,300 to 28,656. In 9 of these the differential count was normal, with a shift to the left in the remainder. None had leukopenia, although 1 (with infectious mononucleosis) had relative lymphocytosis. The sedimentation rate was elevated on admission or 1 day later in 17 cases (74 percent). Serum glutamic oxaloacetic transaminase determinations were done in 14 patients but were not serially obtained in the majority. Elevated levels found in 4 patients were below 100 units except for 1 instance of 107 units. This patient was of interest in that he had a severe and protracted course with frequent recurrences of pain and electrocardiographic changes, usually associated with repeated though transient transaminase elevations. In this patient, the serum glutamic pyruvic transaminase was also determined simultaneously and remained normal.

Purified protein derivative (PPD) intermediate skin tests were done on 15 patients and were positive in 5. Throat cultures in almost

all patients revealed no consistent or significant pattern. Blood cultures were done in a few patients and were sterile. Cold agglutinin titers in 2 patients were 1:32 but were not associated with roentgenographic evidence of pneumonia. The heterophile agglutination titer in 1 patient was diagnostic of infectious mononucleosis; this patient is the subject of a separate report.[7] Pericardial biopsy on 2 patients revealed only evidence of chronic inflammation of nonspecific nature. The patients with a more prolonged course had serial tests for lupus erythematosus factor, which were negative.

Electrocardiogram

Changes in electrocardiogram considered typical of pericarditis are: (1) transient ST elevation in at least 2, usually 3 of the standard limb leads, without reciprocal depression (an apically directed ST vector); (2) transient ST elevation in the lateral precordial leads; and (3) inverted T waves in the 3 standard leads and lateral precordial leads (superiorly and posteriorly directed T vector), occurring after return of the ST segments to the isoelectric line.

Of 22 patients (96 percent) with abnormal electrocardiograms, 11 had ST segment changes considered diagnostic. Characteristic T wave changes developed in 6 of these, while in 4 others T abnormalities were less typical. The eleventh patient did not develop any T wave abnormality after the ST became isoelectric. The direction of the ST vector was usually about 60°, with a range from 30° to 90°, correlating roughly with the direction of the mean QRS axis. In almost all cases, the T wave changes appeared after the ST vector disappeared, but in a few the T abnormality appeared earlier. The ST vector disappeared in from 2 to 6 days in all but 1 patient, in whom it was still present after 9 weeks. In some instances the ST segment shifts were slight, but their significance was established by their return to the isoelectric line in serial tracings.

The remaining 11 patients had only T wave abnormalities on their electrocardiograms. Of these, 6 had characteristic changes and 5 had other changes, usually consisting of generalized flattening of the T waves. One patient developed transient auricular fibrillation, a second an ectopic atrial pacemaker, and a third developed frequent premature ventricular contractions, in addition to the T wave abnormalities.

One of the 23 patients showed no abnormality in his electrocardiogram despite typical chest pain and a pericardial friction rub.

In summary the electrocardiogram was abnormal in 96 percent of the cases, half showing diagnostic ST changes.

Roentgenogram of the Chest

Unfortunately serial roentgenograms were not done in all patients. However, 5 patients (22 percent) showed transient enlargement of the cardiac shadow. This was slight in 3 and marked in 2, 1 of whom had cardiac tamponade. Return to normal size occurred in from 10 days to 6 weeks. Pleural effusion was present in 6 cases, left sided in 3, right sided in 1, and bilateral in 2. Parenchymal pulmonary infiltration was present in 4 cases, left sided in 3, and right sided in 1.

Clinical Course

There were no deaths in this series. Most of the cases were relatively mild, with pain disappearing within 5 days of onset. The degree and duration of fever and the duration of the friction rub correlated well with the clinical course. The rub disappeared in from 1 to 5 days in 7 of the 8 patients. In 1 it was heard for 40 days. This patient had a severe and prolonged course with frequent recurrences and with pericardial effusion, and was hospitalized for 5 months. The presence or absence of a rub had no correlation with severity.

Treatment was symptomatic in almost all cases. A few were treated with a broad-spectrum antibiotic or with penicillin and streptomycin, but this did not seem to shorten the course of the illness when compared with those treated without antibiotics. Prednisone was administered in another hospital to 1 patient with dramatic relief of symptoms, disappearance of fever, and return of heart size to normal. When the steroid was discontinued, there was a sudden recrudescence of the original clinical picture, including enlargement of the cardiac shadow. A second course again produced remission, followed by a second exacerbation when steroid therapy was again gradually discontinued. However, after this there was gradual spontaneous improvement. One patient had evidence of cardiac tamponade, and after pericardial aspiration was attempted unsuccessfully, he gradually improved spontaneously without specific treatment.

Differential Diagnosis

A good idea of the usual differential problem that presents itself initially may be obtained from a listing of the admission diagnoses (table 4). The correct diagnosis heads the list, with the impression of myocardial infarction a close second. The remainder of the initial impressions illustrate well the varied mode of presentation of a patient with pericarditis.

Table 4. *Admission diagnosis—23 patients*

Pericarditis	8	Influenza	1
Myocardial infarction	6	Fever, undetermined origin	1
Pleurisy	2	Meningitis	1
Atypical pneumonia	2	Appendicitis	1
Epidemic pleurodynia	1		

DISCUSSION

The relatively short duration of pain, fever, and disability again emphasizes the benign nature of the disorder. Several of these patients had recurrent episodes, but as a group they seem above average in benignity.

The early routine and subsequent repeated use of the electrocardiogram in patients with chest pain is the greatest single factor in the diagnosis of mild or atypical cases. The evanescent nature of the physical signs and electrocardiographic changes suggests that the diagnosis may have been missed in many other patients. As an illustration, a 12-year-old boy was admitted with a very loud pericardial rub. This disappeared within a few hours and was never heard again, although his fever and tachycardia persisted for several days. His electrocardiograms showed only slight transient ST elevations which could easily have been called normal variants, since an abnormal T wave never developed.

A 19-year-old Negro man had severe abdominal pain initially, and laparotomy was performed. This revealed a normal appendix but swollen and inflamed mesenteric lymph nodes. Three days later pericarditis became apparent when he complained of chest pain, and the electrocardiogram was characteristic. Mesenteric adenopathy is a possible explanation for the abdominal pain seen in a small percentage of cases, although "benign peritonitis" has been postulated as another explanation.[6] Cervical adenopathy was noted in only 3 patients in our series.

Although this hospital has a busy teaching pediatric service, no patient under 12 years of age with nonspecific pericarditis was encountered in a 3-year period.

From table 5 it can be seen that in the majority of patients the diagnosis was established by the presence of pain plus other (usually EKG) change which per se was not diagnostic. These, then, were cases which might have been undiagnosed without high index of suspicion on the part of earlier examiners. This awareness led to confirmatory serial tests. Repetition, particularly of the electrocardiogram, is the only means by which many of these cases with slight changes may be given a definitive diagnosis.

Table 5. ***Incidence of diagnostic features***

	Author's series		*Average from literature* [1, 2]
	Number of patients	*Percent*	*Percent*
Chest pain	22	96	90
Aggravated by respiration	15	68	75
Friction rub	8	35	70
Electrocardiographic changes	22	96	80–90
Diagnostic	11	48	35–65
Nonspecific	11	48	25–45
X-ray: cardiac enlargement	5	22	50–80

The lower incidence in this series of some of the characteristic features, when compared with the literature (table 5), is probably a function of the diagnosis of milder cases. It is noteworthy in this regard that only 5 of the 23 patients manifested the classic triad of typical chest pain, pericardial friction rub, and characteristic electrocardiographic changes. The reported [2] twofold difference between autopsy and clinical incidence of acute pericarditis can probably be decreased by a higher index of suspicion associated with attention to suggestive and nonspecific findings.

SUMMARY

Twenty-three cases of acute nonspecific pericarditis seen in a 3-year period are reviewed. Pain was the most prominent feature, generally characteristic and present in 22 patients. An abnormal electrocardiogram was present in 22 patients, but the changes were diagnostic in only 11. Only 5 of the 23 patients had the classic triad of typical chest pain, pericardial friction rub, and characteristic electrocardiographic changes.

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Ingrown Toenail: A Result of Weight Bearing on Soft Tissue

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INGROWN TOENAIL is an important and frequent cause of loss of duty time in military patients. Because the pathologic physiology is not generally understood, there are many types of treatment advocated and the recurrence rate is high. The term "ingrown toenail" is unfortunate in that it incriminates the nail as the causative factor and is responsible for the fact that most operative and conservative treatments are directed toward the nail. It is our thesis that persons who develop this condition have an unusually wide area of tissue medial and lateral to the nail and that with weight bearing this tissue tends to bulge up around the nail. When such persons trim the nails in a curved or rounded fashion instead of straight across, further bulging of soft tissue is allowed, and as the nail grows out, pressure necrosis of soft tissue occurs. If our thesis that the fault lies not with the nail but with an excess of soft tissue is correct, treatment by removal of a segment of nail is not rational. It increases the relative amount of soft tissue and predisposes to recurrence, and at the same time inept attempts to remove some nail matrix lead to faulty regrowth of the nail. The logical conclusion is that soft tissue should be excised, so that with weight bearing there will be no tissue to bulge up around the nail. We are not discussing the thick, discolored, deformed nails seen in old people, nor trophic changes, fungus infections, and excessively curved nails which pinch the soft tissues of the toe. These are separate groups in which we usually simply avulse the nail by rolling it from its bed and then apply fungicides or whatever specific therapy is indicated.

The Tripler U.S. Army Hospital records of 99 patients admitted for ingrown toenails between December 1949 and September 1956 have been reviewed. Many forms of conservative and palliative surgical treatment were used, and although follow-up is impossible, we know from our current series that recurrence has been frequent.

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Hot soaks, cold soaks, parenteral and topical antibiotics, silver nitrate, and even cautery were used on the painful soft tissues of the toe in an attempt to reduce the inflammation. Painful wedging of cotton underneath the edge of the nail so as to relieve the pressure on the soft tissue was often combined with this (fig. 1a). Shaving the center or removing a central wedge of the nail was also used to relieve the pressure of the nail upon the soft tissues (fig. 1b). In some cases adhesive tape was applied tightly about the toe in an attempt to draw soft tissue away from the nail (fig. 1c). In other cases, the whole nail was rolled off under local anesthesia (fig. 1d), or perhaps a lateral portion of the nail was removed with a special hooked knife (fig. 1e). Removing the nail would relieve the patient's symptoms only temporarily and the condition would recur with the regrown nail. To reduce the amount of soft tissue on the lateral or medial aspect of the toe, a wedge of normal tissue was removed in a few cases (fig. 1f). The most common surgical treatment was excision of the lateral fourth or third of the nail together with the granulation tissue and some of the soft tissue of the toe (fig. 1g). Although many patients benefited from this procedure, many had recurrence of their disease when the nail regrew. In an attempt to stop regrowth of the lateral or medial portion of the removed nail, the base of that portion of the nail and of its bed was often excised sharply, curetted, or even treated with caustics, in some cases down to and including the periosteum of the bone. The common end result was the regrowth of a deformed, thick hooked nail that became as painful as the initial condition (fig. 1h).

Since September 1956 we have advocated a more physiologic and sounder surgical approach to the patient with the "ingrown toenail." Fifty-five patients, 12 of whom had both great toes involved, have been treated as described below.

Patients with a severe purulent infection of the soft tissue are treated with local saline soaks or wet dressings and bed rest for a few days until the inflammation has partially subsided. Antibiotics are not necessary and have not been used. Then, under general nitrous oxide and oxygen anesthesia, or under field or local procaine block anesthesia, the toe is cleansed with soap and water. A generous excision of all soft tissue on the involved side of the toe is performed, starting at the edge of the normal nail and leaving the nail intact (fig. 2a, b, c). The excision must be generous and adequate, often exposing a portion of the lateral aspect of the distal phalanx of the toe. The excision extends at least 0.5 cm behind the level of the base of the nail and is carried out completely to the end of the toe. Any

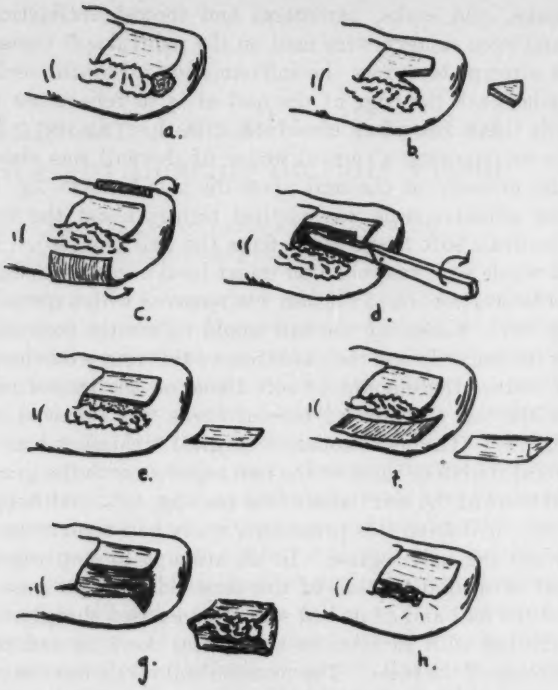

Figure 1. Methods of palliative treatment inviting recurrence of ingrown toenail. (a) Placing a cotton pledget beneath the corner of the nail until it has grown sufficiently long to be cut square across is suitable for early mild cases. (b) Excising a wedge of nail or shaving the nail thin in its central portion tends to make the nail curl, raising the edges from the tissues. (c) Adhesive strapping to pull soft tissue away from the nail. (d) Avulsing the nail by rolling it from its bed requires careful follow-up during the regrowing period. Some authors advocate rolling out the edge on the involved side only and then dropping the nail back to lie on the surface of the area of inflammation. (e) Removing a strip of nail and its matrix, based on the false premise that the nail is causative. (f) Removing a wedge of soft tissue. (g) Removing a strip of nail, matrix, and soft tissue, a more radical form of "e." (h) A regenerated crooked, thickened, deformed nail may be as symptomatic as the original condition.

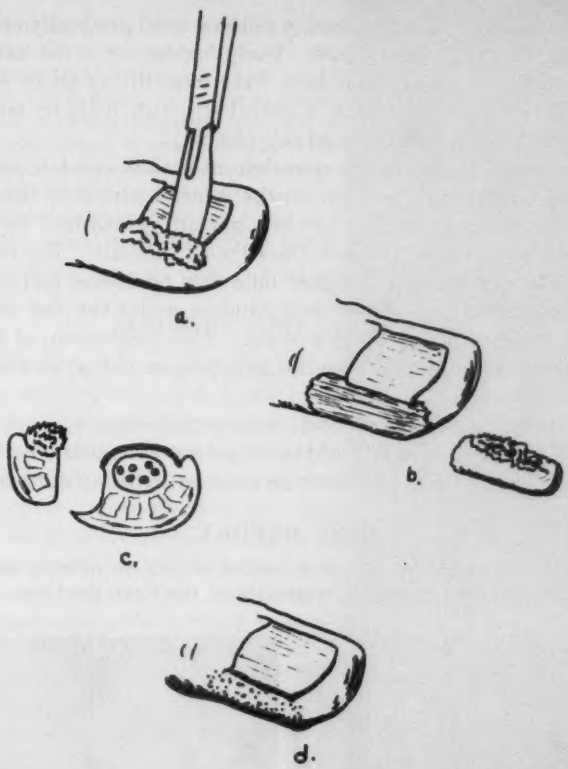

Figure 2. Recommended surgical treatment of ingrown toenail. (a and b) Soft tissue in the inflammatory area is excised generously to prevent impingement of nail on soft tissue. (c) Cross-sectional view, somewhat exaggerated in that the wound surface is more concave than usual. In a case such as this, the plantar skin could serve as a graft to part of the defect, either with a single stitch or by pressure from a dressing. Usually a flatter excision is desirable (see text). (d) Healing gives a painless surface which has not involved the plantar aspect, leaving no tissue to bulge up around the nail on weight bearing.

prominent bleeding vessels are clamped and tied with fine gut sutures. When the excision is done adequately, there is often a skin and soft tissue deficiency measuring 1.5 by 3 cm. This open wound is covered with fine mesh gauze and then bandaged. The patient soaks the bandage from the raw area 24 to 48 hours postoperatively, and re-

peats this soaking 3 to 4 times a day as the wound gradually epithelializes from the periphery inward. Daily bandaging is not necessary. In most cases the patient is able to wear loose-fitting shoes within 2 to 3 weeks. The end result is a healed toe with little or no lateral or medial soft tissue and a normal nail (fig. 2d).

In an attempt to shorten the convalescent period, in a few patients a very short flap of skin was left on the inferior aspect of the excised soft tissue area, and this flap was brought up and sutured down over the wound with one suture near the edge of the nail. The thin skin flap became necrotic and sloughed on a few occasions, and in a few other cases collections of purulent exudate under the flap occurred, delaying the eventual healing process. This refinement of the surgical procedure did not shorten the convalescent period and has since been abandoned.

A complication that required re-hospitalization and additional treatment occurred in only 1 of the 55 patients treated. To the best of our knowledge, there have been no recurrences using our method.

CASE REPORT

A 19-year-old Army private had been unable to perform infantry duty for 3 months because of severe unguis incarnatus of the right great toe. Surgical

Figure 3. Bilateral ingrown toenails in 19-year-old soldier. (a) Dorsal view. Contoured right toe with no excess of soft tissue, 10 months following recommended surgical treatment of ingrown nail. Left ingrown nail has large area of soft tissue both medial and lateral to the nail; with weight bearing, this nail would become buried in soft tissue. (b) End-on view, showing more dramatically the lack of soft tissue bulge on right as compared with the overriding of soft tissue on left. Note that nails actually are the same width, but the left appears only about half as wide as the right because of the soft tissue bulge.

removal of the medial and lateral soft tissues of the toe was accomplished in September 1957. The patient was returned to duty in 3 weeks. He was re-hospitalized in April 1958, at which time there was a tender, raised keratotic growth 4 mm in height and 1 cm in diameter covering a portion of the medial aspect of the re-epithelialized toe. The keratotic area was excised and the wound was allowed to re-epithelialize. Cultures and microscopic examinations of the removed tissue were unremarkable. The patient returned to duty after an additional 32 days of hospitalization. In January 1959 the patient was admitted for excision of the soft tissue of the symptomatic left great toe. The right great toe had been asymptomatic (fig. 3).

There have been no cases of osteomyelitis of the distal phalanx.

SUMMARY AND CONCLUSIONS

Ingrown toenail is a phenomenon secondary to weight bearing in persons with excessive soft tissue medial or lateral to the nail border. There is no change in the nail itself (excluding fungus infection and other entities not germane to this discussion), and excision of a strip of nail simply increase the relative amount of soft tissue, predisposing to recurrence and nail deformity. Based on this thesis, logical surgical treatment would be excision of soft tissue to remove all excess tissue into which the nail could be pushed on weight bearing. Such a method has been used with excellent results in 55 patients since September 1956 without known recurrence.

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SICK CALL 150 YEARS AGO

The life of the soldier, like every other life of irregular exertion and hardship, predisposes to disease while, from the nature of the service, the treatment of military diseases differs from common practice, and requires peculiar experience, both in preventing the attack and also rendering their cure speedy and complete. Having it in mind that military practice requires bold and energetic measures; and that the soldier's absence from duty on the day of actual service is perhaps an irreparable loss to the country . . . hence the necessity of a medical officer possessing superior professional knowledge to others, much decision, and a good deal of acquired experience.—From a letter written in 1808 by Dr. Nisbet to His Royal Highness, The Duke of York: Quoted by Surgeon-Major A. A. Gore in THE STORY OF OUR SERVICES UNDER THE CROWN, London, 1879. Reprinted from *Journal of the Royal Army Medical Corps*, October 1958.

A Form for Recording Sigmoidoscopic Examinations of Dysentery Cases

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DURING the study of dysentery among the prisoners of war on Koje Island in Korea, from 30 to 100 or more sigmoidoscopic examinations were performed daily.[1-4] Under such conditions it was too time consuming to record the observations by handwritten narratives. Furthermore, since the therapeutic effects of various drugs were being evaluated, it was important to have the observations as standardized and as objective as possible. This was particularly pertinent inasmuch as during the seven months of the investigation it was necessary for several persons to perform the examinations. As a consequence, a form (fig. 1) was developed to facilitate the recording of objective observations and to make possible more accurate comparisons between different sigmoidoscopic examinations.

In the study of over 2,000 bacillary and amebic dysentery cases, the sigmoidoscopic report form proved to be of great assistance in the diagnosis of new cases and in assessing the response to therapy. Because it is believed that the form may be applicable to the investigation of other dysentery outbreaks, as well as to the study of colitis patients by physicians, it is described here as it was used in Korea.

SIGMOIDOSCOPIC PROCEDURE

In the Korean study it was not practical to attempt to prepare the patients for sigmoidoscopy by cleansing enemas. The patients were asked if they had had a recent bowel movement. If not, they were instructed to have one and return. In the case of pretreatment (diagnostic) examinations of active cases of diarrhea or dysentery, there were little or no feces to interfere with the observations.

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RECORDING SIGMOIDOSCOPIC EXAMINATIONS

RECORD OF
SIGMOIDOSCOPIC EXAMINATION

PATIENT: _____ Date: _____

PURPOSE: Diagnosis (Pretreat.) ☐ Post-treat. ☐ Days after Rx _____

DIAG.: Unsat. ☐ Normal throughout ☐

Colitis: Severe ☐ Moderate ☐ Mild ☐

Hemorrhoids ☐ Fissure ☐ Polyps ☐

Other

LAB: E. hist.: None ☐ Trophs with RBC ☐ Without RBC ☐ Cysts ☐

Pus (1-4) _____ Other Parasites _____

Bact. Cult. Inoc. _____ Result _____

INSERTED: To _____ (In.) Obstr.: None ☐ Spasm ☐ Feces ☐ Edema ☐ Anat. ☐

Hazard: Pain ☐ Friability ☐

COLITIS: By depth	Proximal 0-4 in.	Median 5-7 in.	Distal 8-10 in.	NOTES
FECES (1-4; WLSF)				
EXUDATE, None				
Blood (1-4)				
Mucus (1-4)				
Pus (1-4)				
MUCOSA, Normal				
Edema (1-4)				
Bleeding (1-4)				
Hyperemia (1-4)				
Petechia (1-4)				
Ecchymosis (No.)				
Granular (1-4)				
Friability (1-4)				
ULCERS, None seen				
Unsat. Visual.				
Isolated (No. & mm.)				
Confluent (1-4)				
Depth (S, D)				
Edge (R, F)				
Shape (R, I, S)				
Surface (XMPBW; OGS)				

EXAMINERS _____

Figure 1. Form for recording results of sigmoidoscopic examinations.

In most instances a scribe recorded the observations upon verbal instructions from the examiner. As this was generally done while the sigmoidoscopy was being performed, the examiner acquainted himself beforehand with the form in order that he could relate the

observations in the correct sequence. With the exception of pre-treatment sigmoidoscopies, all observations were recorded *before* the examiner referred to the case history or was otherwise informed concerning the patient, in order to ensure objective observations and to avoid possibility of bias interfering with the evaluation of the amebicidal drugs. Inasmuch as the examinations were performed routinely at weekly intervals and involved a great number of patients, it was not possible for the examiner to remember the patients.

When a patient entered the sigmoidoscopic tent he handed his case history to the scribe, who recorded on the form the patient's identifying information and the purpose of sigmoidoscopic examination. If it was a post-treatment examination, the scribe noted when the therapy was started and recorded the number of days since the first day of treatment.

The patient was instructed to lean over an improvised table made by bending the iron frame of a Navy canvas bunk at a 90° angle. The table was blocked up to a convenient height for the examiner. After a preliminary examination and the application of a water-soluble nonmedicated lubricant, the sigmoidoscope was inserted just within the anal sphincter. The obturator was removed and lens and inflater attached. The sigmoidoscope was advanced only under direct vision utilizing air inflation as necessary. The proximal area was carefully inspected for evidence of colitis before any trauma produced by the instrument could confuse the picture. After the observations for this area were recorded, the sigmoidoscope was advanced as far as advisable. The depth to which it was inserted was recorded and if it was not advanced to its full depth, obstruction was indicated. The observations of the median and distal areas were made while the sigmoidoscope was being advanced, but in general they were recorded as the scope was withdrawn and the conditions checked.

Material for microscopic examination was aspirated with a 1 ml serologic pipet and a 3 ml rubber bulb. A cotton swab is decidedly unsatisfactory for obtaining sigmoidoscopic materials to be examined under the microscope. Two or more samples were obtained from the most diseased areas observed. The material was mixed with saline and examined for organisms and pus. Temporary stains of trophozoites were prepared with Quensel's [5] or with crystal violet-hematoxylin solutions.[6] Because the facilities for preparing permanent mounts were not readily available, aspirated material was mixed in a vial or on a slide with polyvinyl alcohol (PVA) fixative [7] for processing in the United States. The amebae in stained PVA films frequently showed evidence of motility at the time of fixation (fig. 2).

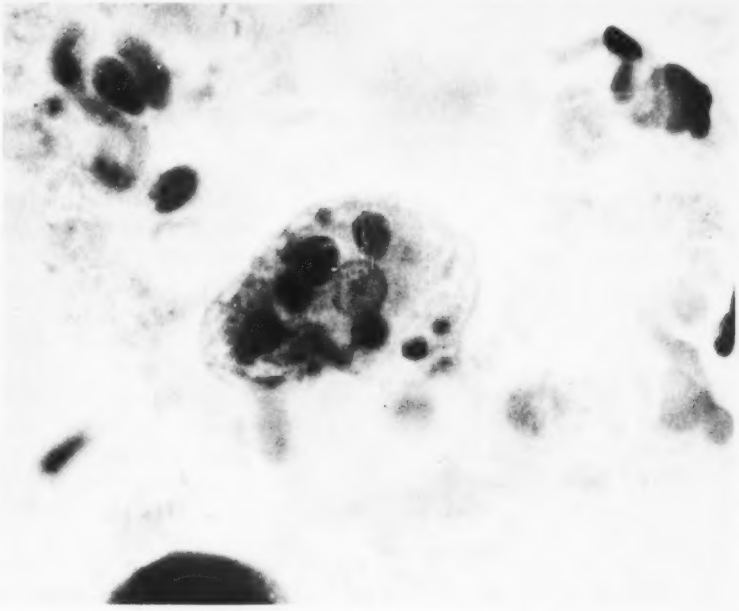

Figure 2. Entamoeba histolytica in stained film of sigmoidoscopic materials preserved in polyvinyl alcohol fixative.

Sterile cotton swabs on long applicators were used to obtain material for the inoculation of bacterial plates (usually Salmonella-shigella and MacConkey's agars). Standard bacteriologic methods were used in the study.

SIGMOIDOSCOPIC FORM

Most of the items on the sigmoidoscopic form need little or no explanation (fig. 1). To facilitate referring to the accompanying figure in the following discussion, the various items will be placed in capital letters or in italics to comply more closely with their appearance on the form. The first two lines in reference to the identification of the *PATIENT* and *PURPOSE* of examination are self explanatory. This portion of the form has been changed somewhat from that of the original used in Korea in order to make it more adaptable to other situations.

DIAG (diagnosis)—*Unsat* (unsatisfactory) was checked if for any reason it was impossible to observe at least the proximal portion of the bowel. The most frequent reason was the presence of feces. *Normal throughout* was checked if no colitis was present for the

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extent of the bowel observed. In the study of amebiasis cases, in which amebic lesions were rarely found in the median and distal segments and never in the proximal segment, *Normal throughout* was checked even when only the proximal area was observed. However, in such cases, the statement "to 4 inches" was inserted. The severity of the *Colitis* under *DIAG* (diagnosis) was not recorded until after the tabulation of *COLITIS: By depth* had been completed. The degree of severity was determined without reference to the results of the laboratory examination. Because there was such wide variation in the colitis observed, it was difficult to establish strict criteria for the terms *Severe*, *Moderate*, and *Mild*. Not only the number and severity of the lesions had to be taken into consideration, but also the total area of the mucosa which was involved. For example, if the entire proximal area was involved with large confluent, bleeding ulcers, *Severe* was checked even though the higher area might not have been examined. On the other hand, if 20 deep isolated lesions of various sizes and shapes were scattered about in the proximal and median areas, and a few in the distal area, again *Severe* was generally checked. If only a few (four or five) smaller lesions were observed in each section, the term *Moderate* was checked. *Mild* was checked if the mucosa was hyperemic, slightly edematous and with one or more ecchymotic areas; or if several pinpoint ulcers were observed in one or more sections; or, perhaps, if only one or two moderately sized ulcers were observed in the 9 inches of the colon. In practice, the examiners attempted to record gradations between the three grades of colitis: that is, mild minus, mild plus, moderate minus, moderate plus, severe minus, and severe plus. Since more detailed observations were recorded below, not a great deal of significance was ascribed to the finer grades. The checking of the colitis constituted a brief summary which gave the over-all impression of the examiner. The other items under *DIAG* (diagnosis) need no explanation.

LAB (laboratory findings)—After the examination of adequate samples obtained through the sigmoidoscope, the appropriate square with reference to *E. hist.* (*Entamoeba histolytica*) was checked. No particular significance was attached to the presence of *E. histolytica* trophozoites *with* or *without RBC*. However, the presence of red blood cells helped to document correct identification of the organisms. If unidentified trophozoites were encountered, a question mark was entered in the square, *E. hist: None*. A brief description and the probable or possible identification were recorded, that is, "immobile trophs but believed to be *E. histolytica*." In order to help differentiate be-

tween bacillary and amebic dysentery, an estimate of the amount of pus cells in the microscopic preparation was made. If they were too numerous to count, *4* was entered. If around 10 were counted in a high dry field, a *1* was recorded. The numbers *2* and *3* were used to indicated intermediate estimates of pus cells. If bacteriologic cultures were attempted, a check was entered on the appropriate line (*Bact. Cult. Inoc.*), and the number of the plate used was also recorded. *Results* of the bacteriologic work were recorded later in the space provided.

INSERTED—The distance that the sigmoidoscope was inserted was recorded in inches or centimeters. If it was inserted less than 9 inches (23 cm), the obstruction or hazard that prevented further penetration was checked. If feces caused the obstruction, the consistency was indicated as *F* for formed, *S* for soft, *L* for loose, and *W* for watery. *Anat.* (anatomic) was used to indicate any anatomic reason which made it impossible to insert the sigmoidoscope further with safety.

COLITIS (*By depth*)—In order to indicate the location of colitis, the lower portion of the colon was divided into 3 areas. The proximal area extended from the anorectal line for 4 inches (approximately 10 cm). Within this area were generally located Houston's valves, usually 3 in number. The median area extended from 4 to 7 inches (approximately 10 to 15 cm). The rectosigmoid junction was generally located within the median area. The distal area extended from 7 to 9½ inches (approximately 15 to 24 cm), requiring insertion to the full length of the sigmoidoscope. The following information was recorded under the columns for the appropriate areas of the colon—*Proximal*, *Median* and *Distal*.

FECES—The approximate quantity of feces present in the area was indicated by recording the numbers from *1* to *4*. The number *4* indicated that the particular portion of the rectum or sigmoid was filled to such an extent that further observation was not possible. The consistency of the stool present was recorded as *F*, *S*, *L*, or *W*, as indicated above.

EXUDATE—If no exudate was observed, *None* was checked. If *Blood*, *Mucus*, and/or *Pus* was observed, a number grade from *1* to *4* was recorded. The number *4* was understood to represent the maximum amount that might be expected in a given portion of the bowel. Since a white membrane (or exudate) frequently covered the amebic ulcers, it was sometimes difficult to differentiate true pus. In general, the white membrane held tenaciously to the ulcerated area while the pus would glide easily in front of the edge of the sigmoidoscope.

MUCOSA—This section of the form usually referred to the condition of the non-ulcerated portion of the mucosa. If no abnormalities were observed *Normal* was checked. All conditions with the exception of *Ecchymosis* were graded from *1* to *4*, depending upon the extent of the involvement. The degree of *Edema* was difficult to judge, particularly in the median and distal portions. In the proximal area, however, the swollen condition of the valves served as a guide. The degree of *Bleeding* was determined before the area had had an opportunity to be traumatized by the sigmoidoscope. Care was taken to determine whether the bleeding was from deep ulcerated areas; if so, it was not recorded in this section of the form but below under *ULCERS*. Relative to *Hyperemia*, *Petechia*, and *Granular* (mucosa), the relative amount of the section involved served as a guide in assigning the grade. For example, if the entire portion was involved, the number *4* was entered. The actual number of ecchymotic areas observed was recorded. In judging *Friability* both the ulcerated and non-ulcerated mucosal areas were taken into consideration.

ULCERS—If the section could be examined satisfactorily and no ulcerations were observed, *None seen* was checked. If feces or exudate made it impossible to observe more than one half of the section, *Unsat. Visual.* (unsatisfactory visualization) was checked. In the squares titled *Isolated (No. & mm.)*, the number and size of the isolated ulcers were recorded in millimeters, for example, "5 ulcers 2 to 12 mm." The length, rather than the breadth, of slit-shaped ulcers was indicated. If more than 20 isolated ulcers were present in a section, "20 plus" was recorded. The squares entitled *Confluent* were used to indicate that the outlines of the ulcerated areas were ill defined or involved a considerable area. Such ulcerations might represent several large coalescent ulcers or an extensive ulcerated area which was perhaps superficial. The grades *1* to *4* roughly represented the portion of the section involved in the confluence. The *Depth* of amebic ulcers was sometimes difficult to judge since they were frequently covered by a membrane or exudate. Those that bled easily were considered to be deep. The recorded letter *S* represented shallow, and *D*, deep. If some of the lesions appeared to be shallow and others deep, both symbols were recorded. On the line labeled *Edge* the letters *R* and *F* were recorded to indicate whether the edges were raised or flat. As it was difficult to judge whether the edge was flat or depressed, this distinction was not attempted. The *Shape* of the ulcers was indicated by the letter *R* for round, *I* for irregular, and *S*

for slit shaped. Combinations of the letters were used to indicate a variety of shapes.

On the line labeled *Surface*, a combination of letters was used to indicate the character of the exudate or the character of the craters in the ulcer. *X* designated exudate present, *M*—mucus, *P*—pus, *B*—blood, and *W*—white membrane. The predominating type of exudate was recorded first after *X*; that is, *XWB*. If the surface or the crater of the ulcer was clean (probably indicating healing), the letter *O* was recorded. This letter was followed by *G* (granular) if the center appeared rough and hyperemic, or *S* if the area was smooth.

NOTES—In the right-hand column of the table under *NOTES*, the examiner could write any additional descriptions or interpretations of the findings relative to the *FECES*, *EXUDATE*, *MUCOSA*, and *ULCERS;* for example, "Although proximal section contained considerable feces, the exposed mucosa appeared normal and free of ulcerations" or "Elevated hyperemic granular mucosa may represent healing slit-shaped ulcers." After looking at the reports of previous sigmoidoscopies, the examiner might comment, "Apparently a relapse—consider treatment with another drug."

The names of the individuals performing the sigmoidoscopy and the microscopic examinations for amebae were enterd on the line at the bottom of the form.

DISCUSSION

Several publications have appeared on various aspects of the investigation of dysentery occurring among Korean prisoners of war in 1951–52.[1,4,8,9] In a number of these it is apparent that the form for recording sigmoidoscopic examinations played an important role in facilitating an otherwise difficult operation. The authors of the present paper, who were responsible for designing the form, believe that it may prove helpful to others performing a significant number of sigmoidoscopies.*

In Korea the form was used successfully by many individuals in recording the results of over 4,000 examinations. In addition to saving much time, it provided a means of recording objective observations in a systematic manner which permitted direct comparisons between patients during later analysis. In the initial stage of the investigation, longhand narrative records were kept. Although some of these were interesting to read because of the enthusiasm of the

*Persons interested in trying the form may obtain copies from any of the authors.

examiner, a complete picture was seldom obtained, however detailed the report.

If carefully performed, sigmoidoscopy is a safe procedure for studying dysentery cases even if great numbers of patients are involved. In the Korean study approximately 650 amebic and 2,000 dysentery cases were examined on several occasions without a single perforation of the bowel. Furthermore, despite the fragility of some of the intestines, there was no evidence that any complications arose as a result of the examinations. It should be noted, however, that the patients involved in this epidemic were generally young adults in good physical condition. It was interesting that only occasionally polyps, very few hemorrhoids, and no fissures or other abnormalities were encountered.

During the investigation, it was thought that the white exudate or membrane over the amebic ulcers represented the presence of deep lesions, for aspirated material from these lesions teemed with amebae. This interpretation was probably incorrect in some instances, especially in view of the recent observations of Juniper, Steele and Chester[10] that in rectal biopsies of apparently similar lesions, the organisms were concentrated in the exudate over a rather superficial type of ulceration.

Sigmoidoscopy has the distinct advantage of assuring the correct identification of material obtained for microscopic examination. There is no opportunity for substitution of specimens by noncooperative patients, and little chance of labeling errors. It is also a procedure adaptable to handling large numbers of patients during the investigation of dysentery epidemics. It cannot compete with the anal swab technic for obtaining large numbers of bacterial cultures, but it has other advantages in that it affords a better, and frequently an immediate, appraisal of the patient's condition. By sigmoidoscopy, information can be obtained for the differential diagnosis of dysentery. In addition to the satisfactory material obtained for bacterial cultures, the type of lesions in the colon wall and the presence or absence of pus and *E. histolytica* help the physician decide whether the patient has bacillary or amebic dysentery. Sigmoidoscopy is a definite aid in the diagnosis of amebiasis.[11] According to Manson-Bahr and Muggleton,[12] biopsy specimens obtained through the sigmoidoscope can be examined unstained for the differentiation of various types of colitis.

Nevertheless, sigmoidoscopy should not be looked upon as a primary method of obtaining fecal material for parasitologic examinations. In acute cases of amebiasis, when large active trophozoites are avail-

able in the rectosigmoid region, the material obtained through the sigmoidoscope is usually adequate for rapid confirmation of amebic dysentery. But in nondysenteric cases, when less typical trophozoites and cysts are present, the limited quantity of material obtainable and the production-line speed of the sigmoidoscopy routine generally make the parasitologic examinations unsatisfactory. Furthermore, it should be remembered that even in acute amebiasis sigmoidoscopy may be inadequate because it fails to reach the regions of the colon most frequently involved (cecum and ascending colon). In most instances the examination of normally passed or cathartic stool specimens should precede the sigmoidoscopic examination.[13] The opportunity to utilize multiple procedures, such as concentration technics and permanently stained smears, and to examine the preparations without pressure may confirm the diagnosis of amebiasis where sigmoidoscopy might fail. In any event, whenever sigmoidoscopy is used in the diagnosis or study of dysentery cases, it is believed that a standard form such as the one described here will be found helpful in recording objective observations made through the sigmoidoscope and the results of microscopic and bacteriologic examinations.

SUMMARY

A reporting form is described which was used to record the results of the sigmoidoscopic examinations of over 2,000 dysentery cases during an epidemic in Korea. The form facilitated the recording of objective observations and thus permitted more accurate comparisons to be drawn between the results of different examinations. It is felt that the form may be found useful by others in their study of colitis cases.

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COMMON SENSE IN THE ARCTIC

Most of the accounts of life within the Arctic or Antarctic Circles, even today, imply or are explicit concerning great danger with every minute's existence; the inference is that anyone and everyone who works there is an intrepid adventurer or a man so dedicated to his work that not even the horrible environment can deter him from it. Nonsense! The men and women working there are no different from us; we have our jobs in Middletown, U.S.A., or France or Australia; they have theirs in the north. Just as we have learned that it is safer to cross an intersection when the light is green, they have their "homely" safety precepts. The "arctic expert" would call these "common sense," but, since this commodity is apparent often only after explanation, here are some, briefly: To leave the community, even as short a distance as a quarter mile, one must be prepared for sudden isolation by storm. Therefore, at all times one has with him enough food, fuel, and clothing for at least several days; if isolated, stay put, keep warm, keep fed, and above all keep busy. One more item of "common sense" is not to take needless chances—after all, we would not try to drive on our highways blindfolded despite the cocksure phrase, "I know this road so well that . . ."—Capt. ALAN D. MATZGER, MC, USAR: The Arctic—A Place To Live and Work (editorial). *A.M.A. Archives of Internal Medicine,* July 1959.

Reiter's Syndrome

Report of 16 Cases, 8 of Which Followed Treatment for Gonorrhea

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THE CLINICAL TRIAD of urethritis, arthritis, and conjunctivitis is usually referred to as Reiter's syndrome after the case described by Reiter [1] in 1916. It occurs almost exclusively in men and represents a common form of arthritis in young male adults.

During the past 3 years 16 caucasian servicemen were admitted to this medical center with the clinical picture of Reiter's syndrome. In this report the syndrome will be discussed with attention to the characteristics of its onset and the implications for its pathogenesis.

MATERIAL AND METHOD

All 16 patients were enlisted men in the U.S. Armed Forces in Europe. Their age varied from 19 to 33 years, with an average of 22. Only 1 of the 16 men was married.

The patients received their initial medical care at the dispensaries. Usually this concerned the urethritis and sometimes the conjunctivitis. Hospitalization became necessary in all cases with the advent of arthritis. Some patients were admitted directly to this medical center, others were transferred from smaller Army or Navy hospitals. The average hospitalization at this hospital was 2 months. Four patients recovered sufficiently to return to their duty station in Europe. The remaining patients were evacuated to the United States either because they needed further convalescence and rehabilitation or because they had completed their overseas tour.

The two cases reported here are examples of the clinical and the laboratory features of the syndrome.

All included cases had at least three features of Reiter's syndrome. Twelve patients had the classic triad with or without additional

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mucocutaneous lesions. In three the conjunctivitis was absent but a typical keratoderma or balanitis circinata was present as a substitute for the third feature. In one case the mucocutaneous lesions were substituted for the urethritis. Cases with only two features were excluded. Recent gonococcic urethritis was not considered a reason for exclusion. Such patients were included if the subsequent conjunctivitis and arthritis were abacterial and if their gonorrhea had been properly treated before the onset of the arthritis.

The above criteria are somewhat arbitrary, but they seem best to suit the circumstances under which the syndrome manifests itself and allow comparison between Reiter's syndrome and postgonorrheal nonsuppurative manifestations.

CASE REPORTS

CASE 1 (No. 1 in table 1). A 24-year-old caucasian soldier developed a purulent urethral discharge associated with dysuria on 10 March 1958. These symptoms occurred 3 days after a sexual exposure with an unknown woman. Urethral smears, made at his dispensary, revealed intracellular, gram-negative diplococci. The examining physician treated him for gonorrhea with 600 mg (600,000 units) of procaine penicillin and the patient became asymptomatic in 2 days. On 30 March 2 days after a second sexual exposure, he again noted a discharge from the urethra. Smears and cultures, taken at this time, were negative for gonococci on three occasions. It was believed that the urethritis was nonspecific. The symptoms cleared promptly following treatment with a broad-spectrum antibiotic and another dose of 600 mg of procaine penicillin. On April 7, however, the patient developed burning of the eyes with redness and a bilateral purulent exudate. Four days after the onset of his conjunctivitis he began complaining of pain and swelling in the second metatarsophalangeal joint on the right. The next day he developed a swollen painful right knee and a rash with ringlike lesions on the glans penis. The rash spread over the distal shaft of the penis and the scrotum, and similar lesions appeared on the oral mucosa. There had been no diarrhea. There was no past history of joint disease or venereal disease. The family history and the system review were noncontributory.

Physical examination on admission at the nearest station hospital revealed a well-developed and well-nourished man. His blood pressure was 110/70 mm Hg; pulse rate, 68 per minute; and his temperature was 98.6° F. The pertinent findings were as follows: There was bilateral conjunctival infection with increased lacrimation. The rest of the ophthalmologic examination findings were normal. Numerous small ulcerative lesions, some with erythematous bases and others covered with a whitish exudate, were dispersed over the buccal mucosa and the tongue. There were moist, circinate, erythematous lesions on the glans penis and papular eruptions on the shaft of the penis and the scrotum. The prostate was normal. There was swelling about the second metatarsophalangeal joint, with marked local tenderness. The right knee was swollen with fluid in the joint space. Local tenderness limited the extent of motion. There was no local heat or redness. The quadriceps muscles were slightly atrophic. The rest of the physical examination was unremarkable.

The laboratory studies revealed a hemoglobin of 15 grams per 100 ml. The white blood cell count was 9,650 per cu mm with a normal differential. The urine sediment revealed numerous white cells. The rest of the urinalysis was negative. Cultures of the urine and prostatic secretions revealed no growth. The antistreptolysin titer was 1: 100. The latex agglutination test was negative. The electrocardiographic findings were within normal limits.

The patient was treated at his station hospital for 4 weeks. Management consisted of bed rest, physical therapy, and 60 mg of prednisolone daily in divided doses. The conjunctivitis and the mucocutaneous lesions healed uneventfully. The arthritis subsided only slowly, and on 27 May the patient was transferred to this medical center. The prednisolone was gradually discontinued and replaced by salicylates. Active physical therapy was continued. The patient recovered completely and was discharged to full duty after a total hospitalization of 10 weeks.

CASE 2 (No. 9 in table 1). A 19-year-old Air Force enlisted man developed a urethal discharge with dysuria on 12 November 1957. No gonococci were found on three smears examined at his dispensary. His last sexual relationship had occurred 3 weeks earlier with an unknown woman. After 4 days of treatment with chlortetracycline (Aureomycin) his dysuria subsided, but a small amount of watery discharge persisted. Eleven days after the onset of his urethritis he developed a bilateral conjunctivitis, for which he received ophthalmic oxytetracycline (Terramycin) ointment. A week later, on 1 December, he noted pain on weight bearing and swelling in the right ankle and right knee. On 3 December, when the tenderness and swelling of the joints became more severe, he was admitted to a local Air Force hospital. On treatment with bed rest, salicylates, and intra-articular hydrocortisone he improved only slightly. On 23 December he was tranferred to this medical center with a diagnosis of Reiter's syndrome. At the time of transfer he complained of pain and swelling of the right knee and ankle. In addition to the low-grade urethritis he had developed a macular rash over the glans and the distal part of the shaft of the penis. The conjunctivitis had lingered on in spite of treatment. There had been no diarrhea.

The past history, the family history, and the system review were not remarkable.

Physical examination revealed that the patient was well developed and well nourished. His blood pressure was 135/70 mm Hg; his pulse rate, 64 per minute; and his temperature was normal. The pertinent findings were as follows: There was bilateral conjunctival injection with a small amount of exudate in the inner canthi. The right knee was swollen with effusion and tenderness on motion. There was local heat but no redness. The right ankle was swollen without heat or redness. The other joints were negative. Examination of the genitalia revealed an uncircumcised male patient with circumscribed red eruptions over the lower part of the shaft of the penis and similar slightly macerated lesions over the glans. The prostate was normal. The rest of the physical examination was noncontributory.

The laboratory studies prior to transfer had been as follows: Smears and cultures from the urethral and ophthalmic discharges revealed no pathogenic organisms. The culture of the aspirated joint fluid was sterile. The blood cell counts were reported as normal and the urinalysis as revealing a pyuria. The admission studies revealed a hemoglobin of 14.5 grams per 100 ml, a hematocrit

of 42, and a white blood cell count of 12,350 per cu mm with a normal differential. The sedimentation rate was 26 mm per hour. The antistreptolysin titer was negative. A roentgenogram of the chest and the electrocardiogram were normal.

The course in the hospital was one of gradual recovery. He received physical therapy and was given 60 mg of prednisolone daily for the first week, after which the dose was gradually decreased to 30 mg daily. The urethritis and balanitis subsided in January 1958 and the conjunctivitis in early February. By the end of February there were no longer objective signs of arthritis, and the prednisolone was discontinued. The patient returned to duty on 12 March 1958.

He was free of symptoms for 9 weeks, until 17 May when he developed redness and burning in both eyes and pain in the right eye. The ophthalmologist noted

Table 1. ***Sequence of events in 16 patients with Reiter's syndrome***

Case	Age (years)	Time Intervals: Sexual exposure	Gonorrhea	Re-exposure	Features of syndrome: First	Second	Third	Additional
		days →	days →	days →	days →	days →		
1	24	S — 3	— GU — 18	- R — 2	— NSU — 8	— C — 4	— A	Mct
2	33	S — 2	— GU — 8		— A — 1	— Mct		
3	20	S — 3	— GU — 7		— NSU — 12	— C — 9	— A	Mct
4	19	S — few	— GU — few		— A — few	— C		
5	21	S — few	— GU — 90	- ?R	— A — few	— C		
6	21	S — 6	— GU — 8		— Mct — 0	— A — 40	— NSU	
7	19	S — few	— GU — 8		— C — 0	— Mct — 7	— A	
8	21	S — ?	— GU (smoldering)		— A — 7	— C — 4	— NSU	
9	19	S	21		— NSU — 11	— C — 7	— A	Recurrence
10	20	S	2		— C — 1	— A — 3	— NSU	Mct
11	21	S	30		— NSU — 17	— C — 1	— A	
12	21	S	3		— NSU — 11	— A — 0	— Mct	
13	22	?S			— A — 5	— NSU — 5	— C	
14	21	?S			— NSU — 21	— C — 0	— A	Mct
15	20	-	Diarrhea	11	— C — 7	— A — 0	— Mct	
16	26	S — 1952: GU & A						
		1953: NSU & A						
		1954: NSU & A & C						
		1955	?R		— NSU — few	— A		

S=sexual exposure
R=re-exposure
A=arthritis
C=conjunctivitis
GU=gonorrheal urethritis
NSU=nonspecific urethritis
Mct=mucocutaneous lesions (keratodermia and/or balanitis circinata)

a bilateral conjunctivitis and an iritis on the right and readmitted the patient to the hospital on 23 May. On 1 June the patient developed a balanitis circinata, this time without urethritis or sexual exposure. At times he complained of arthralgias. No frank arthritis developed. By the end of June he was again practically asymptomatic. Then a few days before his scheduled discharge he engaged in a new sexual adventure during a weekend pass. Four days later he had an acute purulent urethritis, which proved to be gonorrheal. It responded well to three doses of 600 mg (600,000 units) of procaine penicillin. The Reiter's syndrome did not flare up. The patient was asymptomatic at a followup examination on 2 September 1958.

RESULTS

The first patient had a gonorrheal urethritis which subsided uneventfully after treatment. However, 20 days later (2 days after another sexual exposure) he developed a nonspecific urethritis followed 8 days later by a conjunctivitis and shortly thereafter by arthritis, keratoderma, and balanitis circinata. A recurrence of nonspecific urethritis commonly, as in this patient, ushered in the full syndrome in the postgonorrheal group of patients.

The second patient (No. 9 of the table) developed a nonspecific urethritis 3 weeks after sexual exposure. Eighteen days later he had the classic triad. He recovered completely over a 4-month period. Then 9 weeks after recovery the syndrome recurred, allegedly without sexual re-exposure. The relapse was less classic. It consisted of bilateral conjunctivitis, unilateral iritis, balantis circinata, and arthralgias which did not progress to frank arthritis. The acute gonorrheal urethritis which developed at the end of the second episode of Reiter's syndrome was considered a fresh infection, contracted during a new exposure. It reflected the frequency of promiscuous relations in the group of cases beginning with a nonspecific urethritis. No third bout of the syndrome was precipitated.

The sequence of events in all cases is briefly outlined in the table.

Urethritis was commonly but not necessarily the first feature. The urethral discharge varied from a thin, watery fluid to a yellowish, thick material. The conjunctivitis occurred next. It was transient, or persistent with exacerbations during the course of the syndrome. In two instances it was complicated by a unilateral iritis.

There was no set time for the occurrence of arthritis. It usually involved two or three joints. The knees and ankles were most commonly affected, less frequently the wrists, elbows, metacarpophalangeal and sacroiliac joints. In the average case the arthritis was sudden in onset, asymmetrical, and severe for several weeks. It often was accompanied by atrophy of the adjacent muscles, particularly of the quadriceps muscles.

Mucocutaneous lesions such as balanitis circinata and lesions of the skin clinically identical with keratosis blennorrhagica occurred in two thirds of the patients. The cutaneous eruptions involved the soles, the palms, the scrotum, and sometimes the trunk. For their description we refer to Albert and Crone,[2] who from a dermatologic point of view described cases 2 and 3 of table 1.

Extramarital sexual exposure preceded the syndrome in most cases. Only one patient denied any exposure, interestingly enough the only one who had diarrhea. Twelve patients had had sexual contact from

2 to 30 days before the onset of symptoms. In three cases such contact was likely, although the data were incomplete. The time intervals and the information about exposure or re-exposure should be considered with some reserve as they depend on the truthfulness and the cooperation of the patient.

The laboratory studies commonly revealed a leukocytosis, an elevated sedimentation rate, and pyuria. Negative findings were of more importance than positive ones. No specific organisms were found in the urethral and conjunctival exudates at the time of arthritis. The joint fluid was sterile in all cases. The electrocardiographic findings were within normal limits. The Rose test and the latex agglutination test were negative in seven cases. Facilities were not available for the gonococcus complement-fixation test.

Once the triad was established the differential diagnosis was not difficult. The mucocutaneous and the joint manifestations were fairly characteristic in their appearance, distribution, and course. The arthritis usually lasted several months; the keratoderma, several weeks. They could be easily distinguished from the manifestations of a drug reaction. Rheumatoid arthritis at times entered into the differential diagnosis, especially early in the disease in patients who did not yet exhibit the full triad or in patients who never developed more than urethritis and arthritis. The latter group was difficult to classify and had to be excluded from this series, although a number of these cases might have belonged to the Reiter's syndrome.

The natural course of the disease appeared relatively benign. Even with severe arthritis and muscle wasting, recovery was the rule after from 2 to 5 months. The recurrence rate could not be evaluated in our series. One patient had a past history of at least three attacks of Reiter's syndrome; another one developed a recurrence in this theater.

Treatment consisted of intensive physical therapy, salicylates, and a generous diet. Steroid therapy was used in half of the patients. It was somewhat more effective than the salicylates in the acute phase of arthritis, yet it did not seem to shorten the duration of the disease. Improvement from cortisone, prednisolone, or corticotropin was shorter than that from salicylates. A course of penicillin and streptomycin sulfate was given to several of the patients without appreciable effect.

DISCUSSION

Arthritis has been known as a complication of dysentery since the 5th century, when Caelius Aurelianus [3] used the description "rheumatismus intestinalis cum ulcere." Brodie [4] in 1818 presented a number of cases having the triad of urethritis, conjunctivitis, and arthritis

and stated that the disease could occur independently from gonorrheal infection. In 1850 he described a case in which the syndrome recurred nine times. In 1916 Fiessinger and Leroy [5] reported on an outbreak of dysentery among soldiers in Northern France. In four of them the convalescence was complicated by a "syndrome conjonctivo-uretro-synovial." They made the observation that the manifestations were abacterial, whereas Reiter,[1] who reported his case in the same year, attributed the symptoms to a spirochetosis. Paronen [6] studied 344 cases from 1943 to 1946 during an epidemic of Flexner dysentery in Finland.

The syndrome usually has been considered a result of infection, either enteric or venereal. The incidence of diarrhea as a forerunner of the disease has varied considerably in different series. Marche [7] estimated that about 80 per cent of the cases seen in France and North Africa began with an enteric phase and 20 percent with a urethral phase. In most series in the English literature the enteric phase is less common. Hollander [8] observed diarrhea in only 9 out of 53 cases; Hall and Finegold,[9] in 5 of 23 cases. Only 1 out of 16 patients in the present series had a gastroenteritis. The other 15 had a urethritis preceded by extramarital sexual exposure (known in 13, likely in 2).

The role of pleuropneumonia-like organisms in Reiter's syndrome is not yet clarified, for these organisms do not fulfill Koch's postulates for a causative agent. Hall and Finegold [9] isolated pleuropneumonia-like organisms from the urethral exudate of only 1 of 8 patients examined. In our series we were unable to demonstrate the organism in any of 6 patients. Negative culture results in previous series (including our own) should be regarded with some reserve, however, for Shepard [10] and Peoples and associates [11] found that there are strains with such fastidious growth requirements that they can be missed easily when a routine pleuropneumonia-like organism agar is used.

Although the theory that Reiter's syndrome is a venereal infection is strong in view of the high rate of sexual exposure, there are some disturbing time features. The postexposure interval varied from 2 to 41 days in the Hall and Finegold series, and from 2 to at least 30 days in ours. Such variability is hardly consistent with the incubation time of a contagious disease. Furthermore, the propensity to cyclic recurrences indicates that the disease is not followed by immunity but more likely by a hypersensitive state. The recurrences run a self-limited course, and certainly do not resemble the exacerbations of a slowly progressive infection.

The hypothesis that the syndrome has an allergic origin has received consideration, especially in the postdysenteric cases.[6, 12] This theory could explain the time features and also provide a common denominator for the postenteric and the posturethritic forms.

The role of gonorrhea has been controversial. Characteristically the urethral and conjunctival discharge as well as the joint fluid in Reiter's syndrome are negative for gonococci, yet many times a gonorrhea is complicated by abacterial manifestations indistinguishable from the "pure" Reiter's syndrome. In our experience, the triad was the same whether it followed a nonspecific urethritis or a gonorrheal urethritis that became abacterial with treatment. Eight of the 16 patients had a recent and 2 an old history of gonorrhea. Csonka [13] found a history of gonorrhea within 3 months of onset of the triad in about half of his patients. Was the occurrence of gonorrhea coincidental or etiologically significant? For example, could the syndrome be caused by sensitization and subsequent re-exposure to gonococci or their breakdown products? Nowadays, with the ubiquity of antibiotics, exposure to dead or dying gonococci could occur easily without actual contraction of gonorrhea.

Unfortunately serologic studies have been of little help [8, 9] in establishing an etiologic relationship with either the gonococcus or the dysentery bacillus, and the allergic theory is as unproved as the infectious one.

Another concept indicates that microorganisms may persist in the host in an altered form which may escape detection. A number of bacteria are known to be able to undergo a metamorphosis into much smaller particles, the so-called L forms of bacteria.[14] This transformation tends to occur under adverse conditions, either natural or artificial, as in the presence of penicillin. The gonococcus and the dysentery bacillus are among the bacteria which have been observed in the L phase. There is a great similarity in morphology between L forms of bacteria and pleuropneumonia-like organisms; yet the origin of the latter and the relationship between the two is not clarified. Little is known about the pathogenicity of these L forms or about the response of the host to their presence. The phenomenon that bacteria may "play dead" or persist in an atypical form may in time alter our views on infection [15] and bacterial allergy.

That Reiter's syndrome, in spite of its obscure cause, originates from rather well-defined, clinical circumstances provides an opportunity for bacteriologic study. An understanding of its pathogenesis may in turn contribute to the knowledge of more common joint diseases.

SUMMARY

Sixteen cases of Reiter's syndrome are briefly reported, in 15 of which a venereal origin was likely. Eight patients developed the syndrome after treatment for gonorrheal urethritis. The post-gonorrheal syndrome did not differ from the "pure" Reiter's syndrome. Factors of possible importance in the pathogenesis are reviewed.

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Human Plasma Steroid and Electrolyte Concentrations Between 0800 and 1600 Hours

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WHEN it is essential that two blood samples be drawn from each subject in an experiment, it becomes mandatory that the effect of the blood-letting procedures upon the variables under study be thoroughly understood. If the time interval between samples is of considerable length, it then becomes necessary to recognize the possibility of diurnal and emotional responses inherent in such a sampling method.

It was the purpose of the present study to determine whether significant changes occurred in certain blood constituents as a consequence of a 4-hour sampling procedure.

PROCEDURE

Venous blood samples were collected from a total of 460 healthy male subjects ranging in age from 18 to 22 years. Between 18 and 20 subjects were sampled daily, and within these groups homogeneity was strict as to diet, physical activity, and emotional exposure. Two 35-ml blood samples were taken from each subject with a 4-hour interval between samplings. The earliest samples were collected at 0800 hours and the latest were drawn at 1600; thus, overlap was present only in the 1200-hour group. All subjects were at least 3 hours postprandial. The heparinized blood samples were centrifuged immediately and the separated plasma stored by freezing.

Plasma total 17-hydroxycorticoid (17-OHCS) determinations were carried out by the method of Reddy and associates,[1] as modified by Prigmore, Shannon and Feller.[2] Concentrations of sodium and potassium were determined with a Beckman DU flame photometer (spectral energy recording adapter; photomultiplier) utilizing a

From U.S. Air Force School of Aviation Medicine, Brooks Air Force Base, Texas.

hydrogen-oxygen flame. Working standards were prepared as serial dilutions from a stock standard containing: sodium 144 mEq/liter; potassium 5 mEq/liter; calcium 5 mEq/liter; phosphorous 2.2 mEq/liter; and magnesium 2 mEq/liter. All samples and standards were adjusted to a final 1.0 percent trichloroacetic acid concentration.

RESULTS AND DISCUSSION

An analysis of variance was performed on the data for each variable from each of the time groups to determine whether changes occurred in the concentrations of 17-OHCS, sodium, and potassium from the time the first sample was taken to the time of the second sampling 4 hours later. The results of these analyses are given in tables 1 to 3. In addition, an analysis of variance was performed for each variable

Table 1. ***Plasma total 17-hydroxycorticoid concentration between 0800 hours and 1600 hours***

Time groups	No. subj.	Means for 17-OHCS concentration (gamma per 100 ml)		S.D.	P*
		First trial	Second trial		
0800–1200 hours	50	41.19	38.63	12.30	N.S.
0900–1300 hours	45	42.44	41.51	12.91	N.S.
1000–1400 hours	35	36.19	44.49	15.76	<.05
1100–1500 hours	43	35.78	39.52	8.56	<.05
1200–1600 hours	46	43.23	44.06	12.08	N.S.
		S.D. 17.45	15.76		
		P* N.S.	N.S.		

*Probability taken from the analysis of variance.

Table 2. ***Plasma sodium concentration between 0800 hours and 1600 hours***

Time groups	No. subj.	Means for sodium concentration (mEq/liter)		S.D.	P*
		First trial	Second trial		
0800–1200 hours	95	144.4	145.2	1.67	<.01
0900–1300 hours	102	144.4	145.5	2.01	<.01
1000–1400 hours	90	145.0	145.9	2.22	<.01
1100–1500 hours	117	144.8	146.7	2.14	<.01
1200–1600 hours	56	143.5	144.6	2.09	<.01
		S.D. 4.16	4.35		
		P* N.S.	<.05		

*Probability taken from the analysis of variance.

on each trial to ascertain whether the means differed significantly; these results are shown in the last column of each of the tables. Frequency distributions are listed in table 4.

17-OHCS (table 1). Three of the five time groups showed a mean increase for this variable. Two of these three mean increases were statistically significant. No significant differences were observed between the five time groups for either of the trials.

Sodium (table 2). It was observed that for each of the five time groups under study, the sodium level increased significantly during

Table 3. ***Plasma potassium concentration between 0800 hours and 1600 hours***

Time groups	No. subj.	Means for potassium concentration (mEq/liter)		S.D.	P*
		First trial	Second trial		
0800–1200 hours	95	4.69	4.75	0.188	<.05
0900–1300 hours	102	4.83	4.83	0.193	N.S.
1000–1400 hours	90	4.90	4.90	0.206	N.S.
1100–1500 hours	117	4.67	4.75	0.199	<.01
1200–1600 hours	56	4.49	4.55	0.178	N.S.
	S.D.	.408	.404		
	P*	<.01	<.01		

*Probability taken from the analysis of variance.

Table 4. ***Frequency distribution for plasma steroid and electrolyte concentrations between 0800 hours and 1600 hours***

Total 17-OHCS (gamma per 100 ml.)	No. subj.—Trial no.		Sodium (mEq/liter)	No. subj.—Trial no.		Potassium (mEq/liter)	No. subj.—Trial no.	
	1	2		1	2		1	2
3.0– 8.9	6	4	133.0–134.9	1	1	3.30–3.79	3	1
9.0– 14.9	6	2	135.0–136.9	10	2	3.80–3.99	22	15
15.0– 20.9	12	12	137.0–138.9	20	14	4.00–4.19	25	24
21.0– 26.9	24	13	139.0–140.9	69	50	4.20–4.39	56	45
27.0– 32.9	36	35	141.0–142.9	95	77	4.40–4.59	68	73
33.0– 38.9	31	39	143.0–144.9	55	57	4.60–4.79	77	81
39.0– 44.9	24	35	145.0–146.9	90	79	4.80–4.99	82	78
45.0– 50.9	33	25	147.0–148.9	43	76	5.00–5.19	58	65
51.0– 56.9	17	20	149.0–150.9	43	46	5.20–5.39	39	46
57.0– 62.9	9	13	151.0–152.9	24	30	5.40–5.59	24	27
63.0– 68.9	6	9	153.0–154.9	8	16	5.60–5.79	6	4
69.0– 74.9	5	5	155.0–157.2	2	12	5.80–5.99	0	1
75.0– 80.9	4	6						
81.0– 86.9	3	0						
87.0–106.2	3	1						
Total	219	219		460	460		460	460

the 4-hour time lapse between samplings. Further, it can be seen that the mean values for the five first trials did not differ significantly from each other. For the second trials, however, there was a significant ($P<.05$) difference in the means.

Potassium (table 3). Three of the five time groups showed a mean increase in potassium during the 4-hour time lapse. Only two of these three mean increases were statistically significant. The variation in first trial means was statistically significant at the 1-percent level. Similar variation was found among the second trial means. Much of this was attributable to the low mean values, first and second trials, for the 1200 to 1600 hour group.

Reddy and associates,[1] reporting total 17-OHCS values on 6 male subjects, found mean levels of 46 gamma per 100 ml at 0830 hours and 18 gamma per 100 ml at 1700 hours. Brown and associates[3] found that conjugated 17-OHCS followed the same diurnal pattern as free 17-OHCS (that is, highest in the morning, with a downward trend throughout the remainder of the day), but that the conjugated steroid concentration lagged behind the free moiety by a period of 2 to 4 hours. The present study indicated no consistent change in total steroid concentration between 0800 hours and 1600 hours.

Plasma electrolyte concentrations were shown by Fawcett and Wynn[4] to have no definite diurnal variation. Sodium and potassium concentrations in two individuals were found to remain remarkably constant within the day and over a period of months. In addition, the plasma sodium and potassium ranges in 50 healthy young men and women were shown to be very small. Even though, in the present study, a statistically significant difference was observed between each of the first and second trial sodium means, the actual numerical differences between the means were very small.

SUMMARY

Plasma steroid and electrolyte analyses on 460 healthy young adult males led to the following conclusions:

1. There was no consistent change in total 17-hydroxycorticoid concentrations between 0800 hours and 1600 hours.

2. Small but statistically significant increases were found for plasma sodium. No predictable pattern was found for plasma potassium.

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DANGERS OF UNSUPERVISED DIETING

It is unfortunate that current fads of weight reduction are adopted by many individuals who prescribe their own diets or who adhere to sensational diets that are advertised to insure quick results. The danger of voluntary and unsupervised dieting is the problem of the individual. Physicians should, however, recognize the supportive effects of eating in the maintenance of emotional health. Aside from the physical strain of dieting, the physican should remember the inherent emotional strain. Bruch warns that, "The danger of precipitating frank psychosis through injudicious dieting should not be underrated . . . . It stands to reason that for individuals who have used overeating as a mechanism of defense, and thereby grown obese, maintenance of the weight is of extraordinary importance until a new solution has been found." Certainly when a radical change of diet is contemplated, the complex meanings of food to the individual patient should be considered. A sudden and severe change in diet may merely provoke new conflicts and seriously affect the patients' interpersonal relationships.—Psychologic Factors in Dietary Change. *Psychiatric Bulletin*, Spring 1959.

Health Survey of the Trust Territory of the Pacific Islands

ALICE M. HETZEL, B.S.

IN THE SUMMER of 1948 the U.S.S. *Whidbey* began the voyage from island to island that, before its completion, was to take it through the Caroline Islands, the Marshall Islands, and the Northern Mariana Islands. Under the auspices of the United States Navy, a survey staff aboard the *Whidbey* was undertaking a survey of health and sanitary conditions. The ultimate goal of the survey was a physical examination of every inhabitant.

These islands, with the exception of Guam in the Marianas, then designated as the Trust Territory of the Pacific Islands (fig. 1), were the former Japanese mandated islands. Invaded and occupied by American military forces during World War II, responsibility for civil administration of the islands was placed with the Navy, pending the enactment of legislation by Congress designating the permanent governing authority. Under direction of the Secretary of the Navy, the Commander in Chief of the Pacific Fleet served as High Commissioner of the trust territory.

The trusteeship agreement of the United Nations directed the United States to care for and improve the health of the inhabitants. It was recognized immediately that a broad general health-service policy must be established to meet the need for improvement of the health and hygiene in the islands. As a result of the war the natives were in a state of emotional shock. They had been displaced from their homes, their food had been confiscated, trade and industry had been abandoned, and schools were nonexistent. Medical needs had long been neglected. The islanders, a primitive people who had been exposed to the diseases of civilization against which they had no racial immunity, were unable to support doctors, dentists, and nurses in private practice or to maintain hospitals, dispensaries, or departments of public health.[1]

From Medical Statistics Division, Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C.

One of the main difficulties encountered in developing a public-health program for the trust territory was the lack of reliable information concerning health and sanitation conditions. The most reliable reports came from the naval dispensaries where natives living in the immediate vicinity were given medical care and treatment. There was definite indication from these reports that certain diseases were affecting the health of the islanders and that sanitation in general was on a very low level. Without a comprehensive survey, however, a correct appraisal of disease prevalence, morbidity, and sanitation problems could not be made.

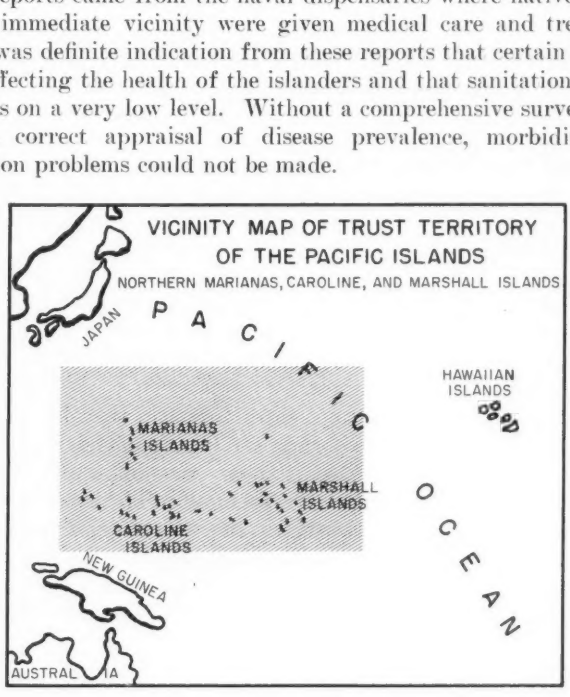

Figure 1. The Trust Territory of the Pacific Islands.

Motivated by these considerations, the Navy undertook a health survey of the trust territory to determine the public-health problems of the indigenous population. The U.S.S. *Whidbey*, converted especially for this survey, was a twin-screw diesel-driven 177-foot vessel displacing 935 tons. The *Whidbey* was equipped with a photofluorographic unit and facilities for complete physical and dental examinations. The survey was begun in the Marshall Islands area on 1 August 1948. Four officers and 21 enlisted men made up the ship's company. The survey staff was comprised of the following personnel: 2 Medical Corps officers, 1 Dental Corps and 1 Medical Service Corps officer, and 9 hospital corpsmen serving in laboratory, x-ray, dental, epidemiologic, and clerical activities.

Traveling from island to island the survey group examined every native present and investigated and evaluated the food, water, sewage, and garbage facilities, as well as the general living conditions and native habits and customs that had a bearing on the subject of health and sanitation. Among other things the survey included a physical examination, photofluorographic examination of the chest, Kahn test, tuberculin skin test, and stool examination. This report concerns those islands surveyed by the U.S.S. *Whidbey* during the period from August 1948 through June 1950. Three of the trust territory civil administrative districts, those of Palau, Saipan, and the Marshall Islands, are represented. All of the western Caroline Islands, the northern Mariana Islands (except Alamagan and Agrihan Islands), and the eastern islands of the Marshall Islands group are included.

Subsequent to June 1950 the U.S.S. *Whidbey* also surveyed the Truk and Ponape districts. However, data for these districts corresponding to those for the three districts mentioned before are relatively incomplete. As a consequence, it is impossible to present a comprehensive description of the health status of the population in the trust territory as a whole. The fragmentary data available for Truk and Ponape, while not included in this article, are contained in a detailed study in the Bishop Museum, Honolulu, Hawaii, and the Bureau of Medicine and Surgery, Department of the Navy.

POPULATION CHARACTERISTICS

The total native population of the trust territory was placed at approximately 54,300 in 1950. About 28,600 of these were in the three districts of Palau, Saipan, and the Marshall Islands. The population figures presented in the accompanying tables, totaling 22,146 for these three districts, are based upon the number of identification cards distributed during the survey. One card was distributed to each inhabitant present on the island at the time of the visit of the U.S.S. *Whidbey*. Although it was intended that every inhabitant be included, the length of time involved in making a survey of this nature, coupled with the fact that there was a great deal of interisland visiting, resulted in some individuals being examined at places away from their home island and others not receiving any examination at all. The area of the island, the scattering of the population, the terrain, and the amount of control exercised over their people by the local chiefs or administrative heads were all factors affecting the extent to which the population was brought into the survey.

Density. Population density varied from island to island. Out of 39 islands or atolls, 5 had a population of less than 100, 24 had a

population between 100 and 499, and 10 had a population of 500 or more. In this latter group were Saipan, Babelthuap, Yap, Koror, Majuro, and Kwajalein, all with over 1,000 inhabitants.

Area was no indication of population. In terms of size, some of the larger islands were very sparsely populated. Tinian and Rota, for instance, while nearly as large as Saipan, had much smaller populations. On some of the tiny islands with an area of less than 1 square mile, the population density was far greater than on the larger islands. Population density in terms of over-all area was misleading in numerous instances for, on many of the larger islands, only a very small area was inhabitable. This was especially true on the volcanic islands where much of the island was too rocky to be inhabited. The result was a concentration of population in a very small area with an extremely high population density, while the rest of the island had few or no inhabitants at all.[2]

Table 1 shows by district the number of females visibly pregnant at the time of the health survey. Estimated annual birth rates based on these figures are also shown. For comparative purposes, in the United States in 1949 birth rates per 1,000 estimated female population, between the ages of 15 to 44, were as follows: all races, 105.2; white, 102.6; and nonwhite, 126.4.[3]

Age distribution. The median age for the three districts combined was 23.0. Over one third of the population was under 15 years of

Table 1. ***Females 15 to 44 years of age visibly pregnant on day of survey***

Population examined	Total	Saipan district	Palau district	Marshall Islands district
	Number			
Total	22,146	4,999	10,575	6,572
Females 15 to 44 years of age	4,138	1,036	2,416	686
Females pregnant on day of survey	406	119	152	135
	Annual birth rate per 1,000*			
Total	24.4	31.7	19.2	27.3
Females 15 to 44 years of age	130.8	153.2	83.9	262.4

*Estimated on basis that all pregnancies will terminate in live births. Rates computed by relating total pregnancies on day of survey to population and multiplying by 4/3.

age, and approximately one fifth was 45 years of age or over. It should be borne in mind that most ages were estimated by an interpreter, as very few natives knew their own age.

The age distribution in the Saipan district presented the most youthful pattern of population found in the territory. The median age was 17.3 as compared with 25.5 for the Palau district and 23.6 for the Marshall Islands district. Only part of the Marshall Islands district is included in this study. Statistics were available for about two thirds of the inhabited islands of the district, accounting for over 70 percent of the population.

Age distributions for the islands or atolls of the Marshall Islands and Saipan districts were relatively consistent. In the Palau district, however, there was considerable variation. Merir, Sonsorol, and Tobi had the highest proportion of old people. There was a strong tendency on the part of the young people of these islands to leave for homes elsewhere while the older people remained. Of Merir's 11 inhabitants, only 3 were under 45 years of age. Approximately 70 percent of Sonsorol's population of 111 was 45 years of age and over, and almost one third of the total had reached or passed the 65-year mark. On Tobi, 60 percent of the 128 inhabitants had reached or passed 45 years of age. At the other extreme were Koror, Eauripik, and Rota, each of which has only 10 percent in the 45-year-and-over age group.

The median age of 22.8 years for Tinian Island appeared high as compared with Saipan and Rota in the same district. There were two groups of inhabitants on Tinian, the Yap-Chamorros and the patients at the leprosarium. The latter group was composed mainly of middle-aged and old people. There were no small children at the colony. Infants born at the leprosarium were sent to Saipan immediately and cared for at the hospital until they were adopted. The median age for the leprosarium patient was 35.4 years, while that for the Yap-Chamorros was 16.6 years, the second lowest in these districts.

An unusual situation existed on Pulo Anna. Fourteen of the sixteen inhabitants were members of one family: the chief; his mother; two brothers; two sisters; two young Indonesian girls, the wives of his two brothers; and six children.

Marital status. The traditional marriage customs with their large gatherings, feasts, and exchanges of property were still practiced throughout the territory. Missionary influence had made its imprint on marriage customs and many marriages were being performed with church sanction.

Earlier marriages for women than for men resulted in a much higher proportion of married females than males in the 15- to 19-year age group, 30.2 percent for females as compared with 4.7 percent for males. In all age groups up to 45 years of age, with the exception of Palau's 35– to 44-year age group, there were proportionately more married females than males. The reverse was true without exception for those 45 years of age and over.

Height and weight. The inhabitants of the trust territory were of medium stature and weight. In the adult age groups the average height ranged from 5 feet 2 inches to 5 feet 6 inches for males and from 4 feet 11 inches to 5 feet 1 inch for females. The average weight for males was from 133 to 145 pounds and for females from 112 to 135 pounds.

Height and weight varied by district. For a given height the inhabitants of Saipan and Palau were heavier than those in the Marshall Islands, with Saipan having a slight edge over Palau in this respect (table 2). The difference was more marked for females than for males. It may be noted in table 3 that the inhabitants of Saipan were slightly taller than those of the other two districts. In Palau males were noticeably shorter than in Saipan and the Marshall Islands.

Blood-pressure readings. Blood-pressure readings were taken for over 60 percent of the population. Only one reading was taken for each individual and all readings were taken routinely during the course of the examination.

Table 2. ***Average weight, by height and sex, of 44-year age group***

Height (inches) and sex	Saipan district	Palau district	Marshall Islands district
	Average weight (pounds)		
60 to 62			
Male	130.6	128.5	122.4
Female	134.4	126.2	123.5
63 to 65			
Male	137.9	137.7	135.3
Female	149.3	135.9	133.1
66 to 68			
Male	150.0	147.6	142.9
Female	(*)	(*)	(*)
69 to 71			
Male	164.4	159.2	160.9
Female	(*)	(*)	(*)

*No females over 65 inches in height.

Table 3. ***Average height by age group and sex***

Age group (years)	Saipan district		Palau district		Marshall Islands district	
	Male	Female	Male	Female	Male	Female
10 to 14	53.4	54.7	52.4	53.3	54.8	54.9
15 to 19	63.4	61.1	61.8	59.5	63.1	59.1
20 to 24	65.8	61.2	64.4	60.2	65.4	59.8
25 to 34	65.4	60.9	64.7	60.1	65.8	59.6
35 to 44	65.6	60.8	64.2	59.9	65.1	60.0
45 to 64	64.8	60.4	63.6	59.2	64.6	59.8
65 and over	63.1	59.1	62.2	57.9	63.5	58.7

No generalizations may be made for the trust territory as a whole with respect to variations in median blood-pressure readings. Variations followed no consistent pattern in the districts. As normally expected, median blood-pressure readings increased with age. This increase was most rapid in the Saipan district. The median systolic and diastolic readings were generally higher for males than for females, with the smallest difference between sexes occurring in the Marshall Islands (table 4).

Table 4. ***Median systolic and diastolic blood pressure by age group and sex***

District and sex	15 to 24 age group (years)		25 to 44 age group (years)		45 and over age group (years)	
	Systolic	Diastolic	Systolic	Diastolic	Systolic	Diastolic
Saipan						
Male	119	69	124	76	135	80
Female	113	70	115	73	132	79
Palau						
Male	118	70	122	74	125	75
Female	117	69	119	70	122	73
Marshall Islands						
Male	116	76	118	77	125	78
Female	113	74	117	76	130	79

DISEASE PREVALENCE

American occupation forces found the health of the islanders generally poor and their needs for medical and surgical care extremely pressing. The conditions under which the native population had been forced to live during World War II, wartime diets of low calorie content, and the inadequacy of medical treatment received prior to and during the war had all left their mark.

By the time the health survey was launched, however, health conditions were much improved. The islanders had received medical care on an emergency basis immediately following American occupation in 1945, until July 1947 when the territory passed from military government to civil administration. In 1947 the health service policy of the Navy for the Trust Territory of the Pacific Islands, outlining a health program for the trust territory, was adopted for the purpose of controlling preventable disease and rendering medical and dental care. By 1 August 1948, the date the health survey started, this program was in full operation and rapid strides had been made in the control of preventable disease. Measures to correct sanitary practices of the islanders were being enforced; treatments, inoculations, and vaccinations had been administered; and the food supply had been improved to the extent that malnutrition no longer existed except in a few areas. Diseases that were previously the most serious threats had been brought under control. In many respects the health survey served as a means of evaluating the health program.

A marked reduction in the prevalence of intestinal parasites was accomplished in the interval prior to the health survey. It is believed that at the time of the American occupation nearly 100 percent of the indigenous population was infested with hookworm. Ascaris and Trichuris were also extremely prevalent. As a result of a mass deworming program, the control of flies, and education regarding health habits, sanitation and particularly the use of sanitary latrines, the prevalence of intestinal parasites had been noticeably reduced throughout the trust territory.

Yaws is another disease that was brought under control with effective treatment. The large number of inhabitants exhibiting multiple scars and the high proportion of positive Kahn tests bear testimony to the widespread prevalence of yaws. Very few primary lesions were noted during this survey, however, as these had been virtually eradicated by extensive treatment with penicillin administered by Navy medical officers on field trips prior to the survey.

The findings of the health survey revealed, however, that certain sanitation problems still remained. Most islands had community latrines that, in general, were clean and in good repair. It was evident, however, that use of the beaches was still a common practice throughout the islands. In many places, leaves and coconut fiber used in lieu of toilet paper were thrown about promiscuously. Maloelap Atoll was the only place where no latrines were available but many islands had clean and well-constructed latrines that were seldom used. Even on Saipan Island, where virtually every household had its own

latrine, use of the beach was evident. Garbage was usually buried in pits but on some islands it was burned or carried out to sea and dumped. The most inadequate methods of garbage disposal were noted on Utirik Atoll and Namorik Atoll where the garbage was allowed to accumulate over long periods of time.

In general, the fresh-water supply for the islands was furnished by rainfall. This was supplemented by wells wherever possible and, on the high islands, springs, streams, ponds, and reservoirs were also utilized. Rainwater was collected in old oil drums by means of spouts and drains on houses and coconut trees. The water was then stored in the drums, often without covers or other safeguards against debris. There were indications that the water supply on the following islands or atolls was contaminated: Babelthuap, Elato, Lamotrek, Yap, Tabal, Ebon, Kwajalein, Majuro, Mili, Maloelap, Namorik, and Ormed. Most wells were contaminated and the natives were warned to boil water before using it. On Saipan Island all water was chlorinated.

FINDINGS OF HEALTH SURVEY

Stool examinations. Stool examinations were made for 2,252 inhabitants of the Saipan district, 4,584 of the Palau district, and 3,495 of the Marshall Islands district, approximately 45 percent of the combined population. As shown in table 5, 52.4 percent of all stools examined were positive for intestinal parasites. One out of every five positive stools showed evidence of multiple species. The highest proportion of positives occurred among children from 5 to 14 years of age.

Comparison of the three districts reveals that Saipan had the highest proportion of positive examinations, 79.3 percent as com-

Table 5. ***Percentage of stools positive for intestinal parasites by age group and sex***

Age group (years)	Percentage positive			
	Total	Saipan district	Palau district	Marshall Islands district
All ages	52.4	79.3	64.5	19.3
Male	53.5	79.5	64.9	18.9
Female	51.4	79.1	64.2	19.6
Under 5	47.7	74.6	51.6	20.9
5 to 14	60.3	88.7	68.8	23.6
15 to 24	48.8	76.4	65.3	16.1
25 to 44	51.4	77.2	64.9	16.0
45 and over	51.5	74.4	65.7	21.4

pared with 64.5 percent for Palau and a much lower percentage of 19.3 for the Marshall Islands. On the following islands or atolls less than 5 percent of the stool examinations were positive: Ngulu, Lib, Aur, Mejit, Likiep, Utirik, Tabal, and Kwajalein. Over 75 percent of the stool examinations were positive on Eauripik, Namorik, Saipan, Elato, Tinian, Kayangel, Faraulep, Woleai, Satawal, Ifalik, and Lamotrek (table 6).

Table 6. ***Distribution of islands by percent of stools positive for intestinal parasites***

Percent of positive stools	Total number of islands	Saipan district	Palau district	Marshall Islands district
Under 5	8	–	2	6
5 to 9	4	–	–	4
10 to 24	4	–	1	3
25 to 49	5	1	4	–
50 to 74	7	–	5	2
75 and over	11	2	8	1

The most prevalent intestinal parasites were hookworm, Trichuris or whipworm, and Ascaris or roundworm. Hookworm was found in 23.1 percent of the stools, Trichuris in 22.3 percent, and Ascaris in 17.2 percent. The relative importance of the three species varied from district to district. In the Saipan district Ascaris had the greatest prevalence, with Trichuris ranking second and hookworm third. The rank order in the Palau district was just the reverse, while in the Marshall Islands district Trichuris was the most prevalent, hookworm ranked second, and Ascaris was practically nonexistent (table 7).

Table 7. ***Percentage of positive stools by parasitic infestation***

Parasitic infestation	Percent positive			
	Total	Saipan district	Palau district	Marshall Islands district
All parasites	52.4	79.3	64.5	19.3
Hookworm	23.1	26.2	34.0	6.8
Trichuris	22.3	40.6	22.0	11.0
Ascaris	17.2	44.2	16.8	.3
Other	2.8	5.6	1.4	2.9

Variations of prevalence rates by age and sex were slightly different for each species. Hookworm and Ascaris show opposite tendencies with respect to age. The former increased with age while the latter decreased. Trichuris showed little change by age. Hookworm was more prevalent among males, while Trichuris and Ascaris had slightly higher rates among females.

The actual procedure of obtaining the sample of stool specimens resulted in a haphazard rather than a representative cross section of the population. Each individual examined was given a stool box and requested to submit a fecal specimen. The number of specimens obtained varied greatly. After the specimens were received, some had to be rejected because of contamination from the specimen wrappings and others because of inadequacy of the specimen. The remaining specimens were examined for ova of the helminth or platyhelminth group. On some of the specimens, examinations were made for protozoa. Stools were examined by the simple flotation technic with a concentrated sugar solution used for ova of helminths and flukes. Direct normal saline smears were used to determine the presence of protozoan cysts. When protozoan cysts were indicated by the smears, iron-hematoxylin stains were made for positive identification.

Kahn tests. Kahn tests were given to 16,320 inhabitants, nearly three fourths of the population of the Saipan, Palau, and Marshall Islands districts The Kahn-test technic was not uniform throughout the portion of the survey reported here. Originally, the three-tube test was utilized. Later, using this same Kahn antigen, only the second dilution was used. Approximately 50 percent of the Kahn tests were positive, with little difference between the sexes (tables 8 and 9). The Palau district had by far the highest proportion of positives—65.4 percent as compared with 38.1 percent for the Marshall Islands district and 30.4 percent for the Saipan district.

Wide variation occurred among the islands, paralleling the variation between the districts. Tabal Island in the Marshall Islands

Table 8. ***Distribution of islands by percent of positive Kahn reactions***

Percent of positive Kahns	Total number of islands	Saipan district	Palau district	Marshall Islands district
Under 25	2	1	–	1
25 to 49	17	–	6	11
50 to 74	13	2	7	4
75 and over	7	–	7	–

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Table 9. ***Percentage distribution of examined population with positive Kahn reactions by age group***

Age group (years)	Percent positive			
	Total	Saipan district	Palau district	Marshall Islands district
All ages	50.1	30.4	65.4	38.1
Under 5	37.6	41.0	61.3	18.9
5 to 14	42.9	18.3	65.0	25.9
15 to 24	49.5	33.7	66.4	37.4
25 to 44	53.8	36.7	66.3	43.0
45 and over	52.9	32.0	63.9	44.0

district had the lowest percentage of all, only 3.6 percent positive. The next lowest was Saipan Island, with 22.8 percent. At the other extreme was Elato Atoll in the Palau district, the only place where every individual tested had a positive reaction. Other islands or atolls where over 75 percent of the population had positive reactions were Kayangel (95.4), Satawal (92.9), Woleai (89.1), Peleliu (87.0), Lamotrek (84.2), and Faraulep (77.3), all in the Palau district.

Generally speaking, the proportion of positive reactions increased with age up to the age group of 45 and over, where a slight decline was noted. The same rate of increase from age group to age group, however, was not observed in each district. In the Saipan district a marked increase occurred between the 5- to 14- and 15- to 24-year age groups, with little change in the age groups thereafter. The conspicuously high rate for Saipan's under-5-years-of-age population, however, is based on only 39 tests. Very little variation is observed between the age groups in the Palau district. On the other hand, the Marshall Islands district exhibits definite increases with each age group.

In this survey a positive Kahn test was considered likely evidence of the presence of yaws infection. It is recognized that the Kahn test is far from being an infallible index for the prevalence of yaws, for a positive reaction to the test may result from many diseases and conditions. Because malaria was not noted in this area and because syphilis, leprosy, and infectious mononucleosis seldom occurred in proportion to the number of positive Kahn tests, it would appear to be a reliable guide in this instance.

Yaws is not, as commonly believed, a venereal disease, but is a contagious disease that may be transmitted from person to person by

direct contact or carried by flies. The spirochete causing yaws, *Treponema pertenue*, enters through open lesions such as scratches and minor cuts. The primary lesions appear most frequently on the lower extremities and may last from 3 months to 3 years. It is not unusual for old healed-over lesions to break down. Tertiary-stage lesions often cause severe scarring and, in the form of gangosa, sometimes completely destroy the features.

Many inhabitants had multiple scars as evidence of a history of yaws. Very few diagnoses of active yaws were established during the course of the health survey. As shown in table 10, most of these cases were found in the Marshall Islands district. Numerous cases of active yaws were suspected, but dark-field examinations of the lesions were negative, possibly due to local treatment of ulcerative lesions with merthiolate and mercuric ointments by the native health aides.

Table 10. ***Results of survey for active yaws, Saipan,* Palau, and Marshall Islands districts***

District and island or atoll	Number of cases	District and island or atoll	Number of cases
Total	73	Marshall Islands.	
		Mejit Island	8
Palau	2	Majuro Atoll	7
		Ailuk Atoll	4
Babelthuap Island	1	Aur Island	3
Elato Atoll	1	Likiep Atoll	3
		Wotje Atoll	3
Marshall Islands	71	Kwajalein Atoll	2
		Namorik Island	2
Ine Island	12	Tabal Island	2
Ebon Atoll	11	Utirik Atoll	2
Maloelap Atoll	11	Lib Island	1

*No active cases of yaws reported for the Saipan district.

During the survey (table 11) urogenital examinations were made only of the male population, as the women were reluctant to permit examination. Little or no acute urethritis from gonococcus was noted but, although cases were not reported on the health record, medical officers at some of the hospitals stated that among the women there were many cases of "salpingitis, gonococcic" and "cervicitis, acute, due to gonococcus." The presenting symptoms of the reportedly widespread gonococcal infection among the men were those of a nongonococcic urethritis. Syphilis was almost nonexistent, a condition found to parallel the prevalence of yaws. Very few cases of primary chancre were found and secondary skin manifestations oc-

Table 11. ***Results of survey for syphilis and gonorrhea, Saipan,* Palau, and Marshall Islands districts***

District and island or atoll	Syphilis	Gonorrhea
Total number of cases	6	12
Palau	–	2
Koror Island	–	1
Yap Island	–	1
Marshall Islands	6	10
Ailuk Atoll	–	1
Arno Island	1	1
Ebon Atoll	1	–
Kwajalein Atoll	–	3
Majuro Atoll	4	4
Namorik Island	–	1

*No cases of syphilis or gonorrhea reported for the Saipan district.

curred infrequently among both men and women. Several cases of syphilis and gonorrhea were reported from the Majuro and Kwajalein Atolls but only an occasional case was reported from any of the other islands or atolls.

Chest x-ray examinations. Chest roentgenograms were made of approximately 82 percent of the population of the Saipan, Palau, and Marshall Islands districts (tables 12 and 13). Many of those not

Table 12. ***Results of chest x-ray examinations***

X-ray findings	Total		Saipan district		Palau district		Marshall Islands district	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
X-ray examinations	18,094	100.0	4,226	100.0	8,733	100.0	5,135	100.0
All chest defects	817	4.5	230	5.4	388	4.4	199	3.9
Tuberculosis, pulmonary	267	1.5	85	2.0	141	1.6	41	.8
Moderately and far-advanced	94	.5	24	.6	53	.6	17	.3
Other active	147	.8	44	1.0	81	.9	22	.4
Arrested	26	.1	17	.4	7	.1	2	.0
Chest tumor	31	.2	7	.2	17	.2	7	.1
Cardiovascular abnormality	48	.3	11	.3	11	.1	26	.5
Bone deformity	32	.2	3	.1	2	.0	27	.5
Other	439	2.4	124	2.9	217	2.5	98	2.0

Table 13. ***Results of chest x-ray survey for active pulmonary tuberculosis by age group***

Age group (years)	Active by x-ray							
	Total		Saipan district		Palau district		Marshall Islands district	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All ages	241	1.3	68	1.6	134	1.5	39	0.7
Under 5	5	.5	3	.8		0	2	.6
5 to 14	15	.3	5	.4	8	.4	2	.2
15 to 24	39	1.1	16	2.0	17	1.1	6	.5
25 to 44	67	1.2	17	1.5	43	1.5	7	.5
45 and over	115	3.2	27	4.4	66	3.5	22	2.0

x-rayed were aged and infirm. The initial examination consisted of a 35-mm photofluorographic roentgenogram that, if the x-ray shadows were suspiciously abnormal, was followed by a 14- by 17-inch chest roentgenogram. The findings reported in this survey were made from the 14- by 17-inch films without further clinical study.

On the basis of these examinations 4.5 percent of those x-rayed were found to have chest defects, and 1.3 percent were suspected of having active pulmonary tuberculosis. The number of chest tumors, cardiovascular abnormalities, and bone deformities was negligible, none being over 0.3 percent of the total x-rayed.

The prevalence rates for active pulmonary tuberculosis increase with age, showing but little variation by sex. The proportion of active-pulmonary-tuberculosis suspects among those x-rayed is greatest for those 45 years of age and over, 3.2 percent as compared with the next highest rate of 1.2 percent for the 25- to 44-year age group. Only slight differences were noted between rates for both sexes, the overall rate for females exceeding that for males by 0.1 percent.

Of the three districts Saipan has the highest percentage of chest defects, with Palau ranking second and the Marshall Islands lowest of all, 5.4, 4.4, and 3.9 percent, respectively. Of the persons x-rayed only 0.7 percent in the Marshall Islands, 1.5 percent in Palau, and 1.6 percent in Saipan were recorded as being suspected of having active pulmonary tuberculosis.

On the basis of the chest roentgenograms performed (table 14), 10 islands had no active pulmonary tuberculosis. On the other islands the percentage of positive films for the x-rayed population ranged from Kwajalein's 0.1 to Faraulep's 6.8. On six of these islands or

Table 14. ***Percentage of chest x-rays indicative of active pulmonary tuberculosis by rank order on selected islands or atolls, Saipan, Palau, and Marshall Islands districts***

Island or atoll and district	Percent active	Island or atoll and district	Percent active
Faraulep Atoll*	6.8	Wotje Atoll**	1.2
Elato Atoll*	3.8	Majuro Atoll**	.9
Sonsorol Island*	3.6	Mejit Island**	.7
Lamotrek Atoll*	3.5	Babelthuap Island*	.6
Tabal Island**	3.4	Satawal Island*	.6
Ine Island**	3.1	Ebon Atoll**	.4
Mili Atoll**	2.9	Ailuk Atoll**	.3
Fais Island*	2.8	Namorik Island**	.3
Yap Islands*	2.8	Kwajalein Atoll**	.1
Aur Island**	2.4	Angaur Island*	0
Koror Island*	2.4	Eauripik Atoll*	0
Maloelap Atoll**	2.2	Lib Island**	0
Kayangel Atoll*	2.1	Likiep Atoll**	0
Ngulu Atoll*	2.1	Merir Island*	0
Tinian Island***	1.8	Peleliu Island*	0
Ifalik Atoll*	1.7	Pulo Anna Island*	0
Saipan Island***	1.6	Tobi Island*	0
Woleai Atoll*	1.3	Ulithi Atoll*	0
Arno Island**	1.2	Utirik Atoll**	0
Rota Island***	1.2		

*Palau district.
**Marshall Islands district.
***Saipan district.

atolls, Ine, Tabal, Lamotrek, Sonsorol, Elato, and Faraulep, over 3 percent of the x-rayed population had active pulmonary tuberculosis.

An interesting experience was reported from Tabal Island. The U.S.S. *Whidbey* visited this island in November 1948 but, because heavy seas rendered the x-ray machine inoperable, the ship was forced to return at a later date to complete the examinations. During the initial visit one 39-year-old woman on the island showed clinical evidence of pulmonary tuberculosis and had positive sputum for tubercle bacilli. At that time nine people were living in the same house with this active case of pulmonary tuberculosis. Eighteen months later when the survey ship returned the woman had died of tuberculosis. The chest roentgenograms for the other nine members of the household were still negative for tuberculosis.

Table 15 shows the diagnoses of tuberculosis that occurred among inhabitants who were not x-rayed. These diagnoses had been established prior to the health survey and, in some cases, the individuals were receiving treatment for the disease.

Nearly 90 percent of the population were tuberculin-tested. Table 16 shows the distribution of islands by percent of positive tuberculin

Table 15. ***Diagnoses of tuberculosis for natives not x-rayed***

District and island or atoll	Total cases	Tuberculosis						
		Pulmonary		Skin	Lymph nodes	Male genitalia	Bronchus	Other
		Active	Arrested					
Total	44	9	3	6	14	1	1	10
Saipan: Saipan Island	6	1	–	2	1	–	–	2
Palau	33	4	3	3	13	1	1	8
Babelthuap Island	4	1	–	1	1	–	–	1
Fais Island	1	–	–	–	–	–	–	1
Koror Island	4	–	–	–	3	–	–	1
Ngulu Atoll	1	–	–	–	–	1	–	–
Peleliu Island	2	–	–	–	–	–	–	2
Satawal Island	1	–	–	–	1	–	–	–
Sonsorol Island	1	1	–	–	–	–	–	–
Yap Islands	19	2	3	2	8	–	1	3
Marshall Islands	5	4	–	1	–	–	–	–
Ailuk Atoll	2	1	–	1	–	–	–	–
Kwajalein Atoll	1	1	–	–	–	–	–	–
Majuro Atoll	1	1	–	–	–	–	–	–
Tabal Island	1	1	–	–	–	–	–	–

tests. Two test-strength dosages of tuberculin, 0.0001 mg PPD and 0.00002 mg PPD, were used for the tests, the latter dosage being used early in the program and occasionally when the 0.0001 mg PPD dosage was not available. On most of the islands in the Marshall Islands district the 0.0001 mg PPD dosage was used, while primarily the 0.00002 mg dosage was used in the Palau district. Both dosages were used in the Saipan district. From Babelthuap Island, where the 0.0001 mg PPD tuberculin dosage was used on about one half of the tested population and the 0.00002 mg PPD tuberculin dosage was

Table 16. ***Distribution of islands by percent of positive tuberculin tests***

Percent of positive tuberculin tests	Total	Saipan district	Palau district	Marshall Islands district
Under 9	3	–	1	2
10 to 19	6	–	–	6
20 to 29	7	–	3	4
30 to 39	8	1	3	4
40 to 49	3	1	2	–
50 to 59	6	1	5	–
60 to 69	4	–	4	–
70 to 79	1	–	1	–
80 and over	1	–	1	–

used on the remainder of the population, it was reported that there was no significant variance between the number of positive reactors to the two dosages.

The findings for the Yap Islands presented in this article are all based on dosages of 0.00002 mg PPD tuberculin. In 6 of the 10 districts of Yap, however, all natives with negative reactions to these first tests were given a second test of 0.005 mg PPD tuberculin. Out of 304 tests there were 251 positive reactions. In other words, of the negative reactors to 0.00002 mg PPD test-strength tuberculin, who were retested with 0.005 mg PPD test-strength tuberculin, approximately 83 percent reacted positively. The practice of employing second test-strength dosages of tuberculin was discontinued. It was found that most individuals reacted to the second dose and the reactions were regularly so severe that they were alarming the natives.

Of the tuberculin-tested population 46.5 percent were positive reactors. The Marshall Islands district had much the lowest percent positive, 19.2 percent as compared with 54.6 percent for the Saipan district and 60.0 percent for the Palau district.

There is wide variation among islands in the proportion of positive reactors (table 17). The widest range occurs in the Palau district,

Table 17. ***Percentage of positive tuberculin tests by rank order, selected islands or atolls***

Island or atoll and district	Percent positive	Island or atoll and district	Percent positive
Yap Islands*	84.5	Lib Island***	34.0
Fais Island*	79.0	Tabal Island***	32.9
Tobi Island*	66.4	Aur Island***	30.0
Koror Island*	63.8	Eauripik Atoll*	28.9
Merir Island*	63.6	Mili Atoll***	27.9
Peleliu Island*	62.4	Namorik Island***	27.5
Angaur Island*	59.7	Majuro Atoll***	25.6
Saipan Island**	58.4	Pulo Anna Island*	23.1
Sonsorol Island*	57.9	Kwajalein Atoll***	22.8
Ngulu Atoll*	56.5	Satawal Island*	20.0
Woleai Atoll*	54.6	Wotje Atoll***	19.2
Ulithi Atoll*	52.5	Mejit Island***	18.0
Babelthuap Island*	47.8	Maloelap Atoll***	16.4
Rota Island**	42.1	Ailuk Atoll***	13.3
Kayangel Atoll*	40.2	Utirik Atoll***	12.6
Lamotrek Atoll*	38.6	Likiep Atoll***	10.1
Ifalik Atoll*	38.5	Elato Atoll*	6.1
Tinian Island**	36.4	Arno Island***	4.3
Ine Island***	36.0	Ebon Atoll***	3.2
Faraulep Atoll*	34.5		

*Palau district.
**Saipan district.
***Marshall Islands district.

from 6.1 percent for Elato Island to 84.5 percent for the Yap Islands. All of the islands in the Marshall Islands district had less than 40 percent positive reactors. The two lowest percentages in this district were those for Ebon Atoll and Arno Island, 3.2 percent and 4.3 percent, respectively. Most consistency was shown in the Saipan district, where the percent positive was 36.4 percent for Tinian Island, 42.1 percent for Rota Island, and 58.4 percent for Saipan Island.

The proportion of positive reactors progresses steadily with age (table 18). The only exception is the Saipan district where the peak is reached in the 15-to-24-year age group and a slight decline occurs after the age of 44. The percentages for both sexes in each district are very close. Where substantial differences exist the higher percentage is for males.

Table 18. ***Percentage of positive reactions among tuberculin-tested population by age group and sex***

Age group (years)	Percent positive			
	Total	Saipan district	Palau district	Marshall Islands district
All ages	46.5	54.6	60.0	19.2
Male	47.6	54.4	61.2	22.1
Female	45.3	54.8	58.8	16.2
Under 5	9.1	8.0	16.3	1.7
5 to 14	32.7	44.3	40.1	6.9
15 to 24	53.3	78.7	65.4	20.9
25 to 44	60.3	73.0	73.5	27.7
45 and over	58.9	71.1	76.2	27.7

Skin diseases. Skin diseases are prevalent throughout the territory. The low standards of hygiene among the islanders and the humid, hot climate of the area are all conducive to these conditions.

Dermatophytosis is the most common skin disease. The prevalence rate for the three districts combined was 298.5 per 1,000 inhabitants. The Saipan district had the highest rate for this disease, 379.9 as compared with 308.7 for the Marshall Islands and 253.7 for Palau. Over one-half the population of Tabal, Aur, Faraulep, Satawal, Rota, Wotje, Lamotrek, and Maloelap had dermatophytosis. In this class tinea versicolor is in such common occurrence that it is ignored by the natives. Tinea cruris and tinea circinata are also prevalent.

The prevalence rate for diseases of skin and cellular tissue was 149.2 per 1,000 persons. This group of diseases includes a high proportion of local skin infections. These include ecthyma, which is especially

prevalent in this area, and such conditions as diseases of the sweat glands, dermatitis seborrheica, and molluscum contagiosum. Rates were much higher in the Saipan and Marshall Islands districts than in the Palau district—246.2 and 214.2 per 1,000 inhabitants as compared with 62.9, respectively.

MISCELLANEOUS DISEASES

Prevalence rates for diseases which occurred with greatest frequency are presented by district in table 19. These diseases were diagnosed from the general physical examinations rather than from special tests and examinations.

Table 19. ***Morbidity for selected diagnoses***

(Prevalence rates per 1,000 examinations)

Selected diagnosis	Total		Saipan district		Palau district		Marshall Islands district	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Examinations	22,146	(*)	4,999	(*)	10,575	(*)	6,572	(*)
Dermatophytosis	6,611	298.5	1,899	379.9	2,683	253.7	2,029	308.7
Chronic tonsillitis and nasopharyngitis	3,326	150.2	1,433	286.6	555	52.5	1,338	203.6
Diseases of the skin and cellular tissue	3,304	149.2	1,231	246.2	665	62.9	1,408	214.2
Pterygium	2,087	94.2	449	89.8	675	63.8	963	146.5
Degenerative joint disease	1,563	70.6	262	52.4	900	85.1	401	61.0
Conjunctivitis	909	41.0	273	54.6	443	41.9	193	29.4
Cataract	784	35.4	87	17.4	519	49.1	178	27.1
Acute respiratory infections	632	28.5	426	85.2	123	11.6	83	12.6
Neoplastic diseases	325	14.7	60	12.0	74	7.0	191	29.1
Inflammatory diseases of ear	217	9.8	132	26.4	10	.9	75	11.4
Opacity of cornea	211	9.5	82	16.4	86	8.1	43	6.5
Vitamin deficiency	195	8.8	101	20.2	28	2.6	66	10.0
Anemia	185	8.4	64	12.8	4	.4	117	17.8

*Not applicable.

The most prevalent diseases in the Saipan, Palau, and Marshall Islands districts were skin diseases, diseases of the eye, and respiratory diseases. Leprosy was also of major importance. Other diseases of wide prevalence were degenerative joint disease, neoplastic diseases, rickets and vitamin deficiency, anemia, and inflammatory diseases of the ear. Diseases carried by mosquitoes and other arthropods do not assume the importance in the trust territory that is usual in other tropical areas. Malaria is not an indigenous disease at the present

time because of the absence of anopheline mosquitoes. None of the rickettsioses were present. Although dengue, typhoid fever, and amebic dysentery were formerly regarded as widespread in the territory, no cases were reported present in these three districts during the survey. Several cases of filariasis were reported from the Palau district and one case from the Saipan district.

It should be borne in mind that some of the variations occurring among the islands may be due to the fact that examinations on the various islands were performed during different seasons of the year and by different personnel.

Diseases of the eye. Over 4,000 cases of diseases of the eye and adnexa oculi were reported from this area; the prevalence rate was 198.4 per 1,000. Pterygium, conjunctivitis, and cataract were greatest in occurrence. The intense sunlight, fine coral sands blowing about, the use of open fires, and frequent submersion in salt water are considered factors possibly contributing to the wide prevalence of pterygium and conjunctivitis. Cataracts were mostly of the senile type. Eighty-five cases of blindness were reported; 17 of these were bilateral and 68 were unilateral. It is believed that most of these were either congenital or resulted from physical injury.

In comparison with the other districts, the Marshall Islands had a strikingly high rate for pterygium, 146.5 per 1,000 persons as compared with 89.8 for Saipan and 63.8 for Palau. Conjunctivitis was most prevalent in the Saipan district, while cataracts occurred most frequently in the Palau district.

Acute respiratory infections. Acute respiratory infections were in common occurrence throughout the three districts. The over-all prevalence rate was 28.5 per 1,000 persons. This rate was much higher in the Saipan district than in the Marshall Islands and Palau districts, 85.2 per 1,000 persons as compared with 12.6 and 11.6 respectively. The changeable humid climate, crowded living conditions, sleeping on floors, low levels of nutrition, and poor standards of sanitation were undoubtedly factors contributing to these diseases. Saipan Island had an unusually large number of acute respiratory infections for its examined population. Chronic tonsillitis and nasopharyngitis were widespread in this area. The prevalence rate for the 3 districts combined was 150.2 per 1,000 persons. The rate for the Palau district, 52.5, was far below those for Saipan and the Marshall Islands, 286.6 and 203.6, respectively.

Leprosy. Eighty-six lepers from various parts of the trust territory were under treatment at the leprosarium on Tinian Island at the time of the health survey. Of these cases, 25 were thought to be lep-

romatous, 59 tuberculoid, and 2 mixed. As shown in table 20, 83 additional cases clinically suspicious for leprosy were found in the Saipan and Palau districts during the course of the survey. None were reported from the Marshall Islands district.

Table 20. ***Results of survey for clinically suspicious cases of leprosy, Saipan, Palau, and Marshall Islands* Districts***

District and island or atoll	No. of cases	District and island or atoll	No. of cases
Total	83	Palau—Continued	
		Yap Islands	3
Saipan: Saipan Island	65	Koror Island	2
		Satawal Island	2
Palau	18	Woleai Atoll	2
Lamotrek Atoll	4	Ejato Atoll	1
Babelthuap Island	3	Fais Island	1

* No clinically suspicious cases of leprosy for Marshall Islands district.

The fact that the true macular lesion is not readily recognized by other than specialists in the field may have reduced the discovery rate for leprosy in this survey. Recognition of leprosy was especially difficult because of the prevalence of tinea versicolor and traumatic contracture, both of which required differentiation from the disease. Personnel conducting the survey were reluctant to make a diagnosis of leprosy where there was any question of its certainty.

Diseases of ear. Inflammatory diseases of the ear occurred at the rate of 9.8 per 1,000 inhabitants. The majority of cases were in the Saipan district where the rate was 26.4 per 1,000 persons. The rate in the Marshall Islands district was 11.4 and only 0.9 in the Palau district.

The most prevalent disease of the ear was "infection, diffuse, external auditory meatus." It is an interesting fact that of the 161 cases reported, 101 were on Saipan Island. It is not known whether personnel conducting the survey were more thorough in making examinations on this island than they were elsewhere or whether an epidemic was in occurrence at the time of the survey.

Other conditions. Degenerative joint disease was rather prevalent, showing a rate of 70.6 per 1,000 inhabitants in the three districts combined. Rates were highest in the Palau district and lowest in the Saipan district. This disease was most prevalent among the aged.

A total of 325 neoplastic diseases was reported, establishing a prevalence rate of 14.7 per 1,000. Only 11 neoplasms were proved malignant, although other malignancies were suspected. The malig-

nant neoplasms were distributed among the islands or atolls as follows: Saipan, 3; Babelthuap, 2; and 1 each on Tinian, Ulithi, Woleai, Yap, Kwajalein, and Wotje. Among the 312 benign neoplasms there were 114 melanomas of skin, 63 lipomas, and 29 hemangiomas and lymphangiomas. The bulk of these were on Majuro, Ebon, Saipan, Yap, Babelthuap, Maloelap, and Mili.

The prevalence rate for vitamin deficiency was 8.8 per 1,000 inhabitants. Of the 195 cases reported, 98 were on Saipan Island where the prevalence rate was 24.2. Other islands where the rate was high were Ine, 72.8; Arno, 57.6; and Mili, 28.2.

Anemia, with a prevalence rate of 8.4 per 1,000 persons, was reported in substantial numbers from Saipan, Majuro, Ebon, and Mili. According to reports of this survey anemia was practically nonexistent in the Palau district.

It was reported that a large number of cases of leukoplakia buccalis were seen on Saipan and Babelthuap Islands. These occurred principally among betel-nut chewers. A comparatively small number of cases were reported on the health record cards used in this study for tabulation purposes. In the summary reports accompanying the cards, however, it was estimated that on Saipan alone over 200 cases of leukoplakia buccalis were observed. Many of these were verified by biopsy. It was further pointed out in the reports that, although betel-nut chewing was also a common practice on the Yap Islands, leukoplakia buccalis was not prevalent there. It was suggested that this might have resulted from the oral mud packs used on Yap to hide the staining effect of the betel nut. The mud packs were not used on Babelthuap. The reports from Saipan did not state whether mud packs were used there.

SUMMARY

In the summer of 1948 a survey staff aboard the U.S.S. *Whidbey* began a health survey of the Trust Territory of the Pacific Islands, its objective being a physical examination of every inhabitant of the area. This report covers the civil administrative districts of the Saipan, Palau, and Marshall Islands. Fifty-two percent of all stools examined were positive for intestinal parasites. The most prevalent intestinal parasites were hookworm, Trichuris, and Ascaris. Approximately 50 percent of the Kahn tests were positive. This was judged to be evidence of the yaws infection on the islands. Of those receiving chest x-ray examinations, 4.5 percent were found to have chest defects and 1.3 percent were suspected of having active pulmonary tuberculosis. The number of chest tumors, cardiovascular

abnormalities, and bone deformities was negligible. The incidence was 0.3 percent or less of the total number of inhabitants x-rayed.

The general physical examinations disclosed that the most prevalent diseases were skin diseases, diseases of the eye, and respiratory diseases. Leprosy was also of major importance. Other diseases of wide prevalence were degenerative joint disease, neoplastic diseases, rickets and vitamin deficiencies, anemia, and inflammatory diseases of the ear.

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PROGRESS IN DIABETES

Diabetes continues to maintain an unchallenged position in the study of clinical conditions chiefly because it represents all aspects of medicine. The number of diabetic patients increases each year, not because it is as such on the increase, but rather because the thousands of undiscovered cases are now being discovered. . . . The future of diabetes is brighter now than ever in the past. Research may bring about fewer complications, oral management and even eventual cure, but our present knowledge, when applied, makes the future more hopeful. Early diagnosis, better management, control of disabling conditions and efforts in the prevention of diabetes are all important steps toward the goal we are all striving for, namely, make the two million known diabetic patients and the one and one-half million undiscovered cases a valued part of everyday living because they are quite like their nondiabetic neighbor.—I. W. Wilkens: The Future of Diabetes. *The Journal of the Indiana State Medical Association*, October 1958.

Case Reports

Localization of Spinal Cord Injury in a Deep Sea Diver

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THIS CASE REPORT illustrates the occurrence and persistence of a specific localized lesion of the spinal cord following inadequate decompression of a diver. The fact that delayed recompression appears to have been of some benefit is noteworthy.

Behnke [1] has estimated that up to 5 percent of decompression injuries in deep-sea diving and about 2 percent in caisson workers give rise to symptoms referable to the presence of intravascular or extravascular nascent gas bubbles. The most common type of injury is the peripheral cramplike pain known as bends. Occasionally, the nervous system is involved; this serious type of injury has received careful evaluation in an excellent monograph by Haymaker and Johnson.[2]

CASE REPORT

On 24 March 1957, a 29-year-old commercial diver made two dives to depths of about 135 feet. The ascent from the first dive was rapid, with no stage decompression. The ascent from the second dive was controlled and there was an 8-minute stop at a depth of 10 feet. Each dive was about 20 minutes long, with an interval between dives of about 1 hour. Immediately after coming to the surface following the second dive, the patient experienced dizziness, nausea, generalized aching, weakness of the left arm and leg, and numbness of the right side. He went to bed, and after a sound sleep awoke free of symptoms except for persistent numbness on the right side of his body and muscular weakness of the left side. In addition, he felt a slight stiffness and tenderness at the base of his neck. There were no bladder symptoms.

The patient was first examined 2 days after the injury. Physical findings were not remarkable except for the neurologic examination. There was localized

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tenderness over the seventh cervical vertebra and anesthesia to pinprick up to the level of the fifth thoracic vertebra on the right. Proprioception and touch sensation were intact; temperature perception was not checked. The deep tendon reflexes were slightly more active on the left side. The left ankle exhibited clonus. There was no Babinski sign. Cremasteric and abdominal reflexes were absent. Muscle power of the left arm and leg was slightly weaker than that of the right arm and leg. The patient's sensorium was clear. One observer, however, noted slight aphasia. The blood pressure was 122/80 mm Hg and the pulse 52.

On the day of examination, 2 days following the diving injury, the patient was recompressed according to the following schedule:

FEET	TIME	GAS
100	30 min	Air
80	12 min	Air
60	12 hr	Air
50	2 hr	Air
40	2 hr	Air
30	2 hr	Oxygen
20	2 hr	Air
10	2 hr	Oxygen

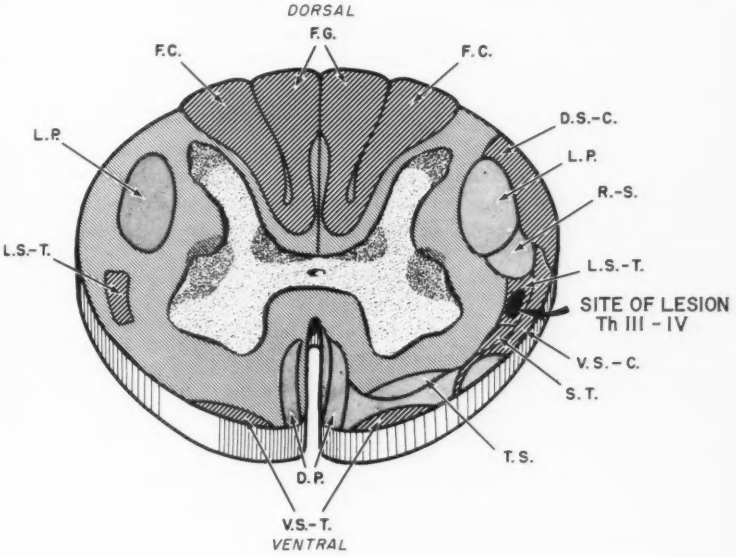
It was not anticipated that the delayed recompression would have any beneficial effect. However, the left ankle clonus decreased, as did the tenderness and soreness at the base of the neck and over the seventh cervical vertebra area. Deep tendon reflexes became symmetric and equal, and muscle strength on the left side of the body was restored to normal. Sensation, which had not been examined previously, was now hyperesthetic on the right side to the fourth thoracic vertebra. Subjectively, the patient did not report appreciable improvement.

Five days after the accident, the patient reported a partial return of sensation on the right side. Seven days after the accident, muscular function, which had been diminished on the left side, was stated to be normal. A nonpainful blister was noted on the right foot 8 days after the accident. Paresthesia of the right side was also noted at this time and lasted for 2 days. Thirteen days after the accident the patient was re-examined. Sensory impairment on the right side persisted.

Twenty months later the patient was again examined. After intermittent diving for 6 months following his diving injury, he had changed his occupation. He complained of mild stuttering, occasional mispronounced words, and intermittent, involuntary muscular contractions of the left leg occurring usually at night. For several months prior to this examination, the patient had experienced interscapular knifelike pains radiating into his neck. The physical examination again was essentially negative, except for the neurologic findings. There was again hyperactivity of the patellar and Achilles tendon reflexes associated with sustained clonus of the left foot. Clonus of the right foot was present but not sustained. The Babinski reflexes were normal. There was no evidence of muscular atrophy or weakness. However, the patient was unable to distinguish pain or temperature downward from the fourth thoracic vertebra on the right side. The Romberg sign was negative and performance of coordination tests was good. An electroencephalographic tracing was essentially normal.

DISCUSSION

The patient's initial complaints and our findings appear to indicate decompression injury. The spinal cord symptom complex can best be explained by a nonreversible lesion at the level of the fourth and fifth thoracic vertebrae, specifically involving the left lateral funiculus (figs. 1 and 2), and a reversible lesion at the level of the sixth, seventh, and eighth cervical vertebrae. It is remarkable that the spinal cord injury was so limited that there was no interference with micturition or defecation. In some respects the case demonstrates a type of Brown-



	TRACTS FROM BRAIN TO CORD
	TRACTS FROM CORD TO BRAIN
D.P.	DIRECT PYRAMIDAL TRACT (V. CORTICAL SPINAL)
D.S.-C.	DORSAL SPINO-CEREBELLAR TRACT
F.C.	FUNICULUS CUNEATUS (BURDACH)
F.G.	FUNICULUS GRACILIS (GOLL)
L.P.	LATERAL PYRAMIDAL TRACT (L. CORTICAL SPINAL)
L.S.-T.	LATERAL SPINO-THALAMIC TRACT
R.S.	RUBRO-SPINAL TRACT
S.T.	SPINO-TECTAL TRACT
T.S.	TECTO-SPINAL TRACT
V.S.-C.	VENTRAL SPINO-CEREBELLAR TRACT (GOWER)
V.S.-T.	VENTRAL SPINO-THALAMIC TRACT

Figure 1. Typical cross section of the spinal cord with the lesion indicated in the left lateral spinothalamic tract.

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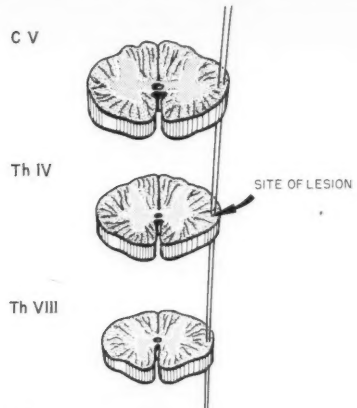

Figure 2. Pathway of the left lateral spinothalamic tract, carrying pain and temperature.

Séquard syndrome with respect to a crossover of motor and sensory impairment.

The type of aphasia displayed indicates involvement of the posterior part of the left inferior frontal gyrus (Broca's area). Other scattered but less easily located lesions gave evidence of their presence. Notable was the fact that there appeared to be some improvement following the delayed treatment. Recompression probably served to promote the resolution of residual bubbles and to supply some additional oxygen at the higher chamber pressure to the injured areas. The residual findings are probably the result of permanent injury to the spinal cord and brain. Although the speech difficulty and incoordination were more disconcerting to the patient than disturbance in sensation, these complaints did not appear to be serious in nature.

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Spinal Cord Injury Following a Scuba Dive to a Depth of 350 Feet

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CAPTAIN ALBERT R. BEHNKE, MC, USN (RET.)

THROUGHOUT the United States, adolescents and adults are engaging in diving activities utilizing self-contained underwater breathing apparatus (Scuba). This type of equipment is reasonably safe at shallow depths in the hands of trained persons. There are, however, reckless youths who seek to establish new diving records without adequate supervision or additional equipment to provide a reserve air supply. What is most deplorable is the absence of compression chamber facilities in the immediate area for the treatment of accidents. The following case description is representative of the critical type of injury that may be expected to occur in Scuba diving to unwarranted depths as a result of lax supervision and the absence of area facilities for handling accidents.

CASE REPORT

A 22-year-old civilian had on several occasions with Scuba attained depths of 260 to 300 feet without mishap in Monterey Bay, California. On 31 January 1959, in the attempt to set a new record, he descended rapidly, by means of a 40-pound weight supported by the right arm, to a depth of 350 feet as indicated by a marker on the descending line. At this depth he experienced blurring of vision, constriction of peripheral vision, numbness, and loss of consciousness. When he regained partial consciousness, he estimated that he was about 50 feet below the bottom of the small, standby boat. After he was pulled aboard it was observed that he was extremely apprehensive. The total time for this dive was reported as about 7½ minutes. The diver was able to stand, but within 2 or 3 minutes, he complained of "squeezing" pains in the anterior part of the chest, sharp pains in the posterior neck area, and a hammering, stabbing pain throughout the right arm. After his suit was removed, he attempted to take a few steps, but his legs became numb and he developed severe paraparesis of the lower extremities.

A Coast Guard craft took the patient ashore. An Army helicopter then transported him to the Naval Dispensary, Monterey. Here, the medical officer observed that the patient's right arm was mottled, painful, and immobile, and his general condition critical. The patient was further transported to the U.S. Naval Shipyard, Hunter's Point, where a landing was made near a diving barge equipped with a recompression chamber ready for operation.

From U.S. Naval Hospital, Oakland, Calif., and U.S. Naval Radiological Defense Laboratory, San Francisco, Calif.

The medical problem was not only to restore circulation to embolic areas of the spinal cord by means of recompression and to effect a re-solution of bubbles, but to provide an increased oxygen supply to the ischemic, edematous nervous tissue. To this end, the chamber was maintained at a pressure between 3 and 6 atmospheres for a period of about 12 hours. This was followed by a slow decompression to normal barometric pressure, requiring an additional 36 hours (table 1). Two hours had elapsed between the onset of the diving injury and the initiation of recompression equivalent to a depth of 165 feet.

Table 1. ***Recompression outline***

Date	Time	Equivalent depth (feet)	Duration	
			min.	hr.
31 Jan	1230–1242	To 165	12	~1.0
	1243–1333	165	50	
	1334–1434	To 100	60	1.0
	1435–1535	100	60	1.0
	1536–1836	90	180	3.0
	1837–0037	80	360	6.0
1 Feb	0038–1238	66	720	12.0
	1239–1639	60	240	4.0
	1640–2038	50*	238	4.0
	2039–0059	40*	260	4.3
2 Feb	0100–0507	30	247	4.0
	0508–0908	20	240	4.0
	0909–1230	10	200	3.3
	1231	Surface	Total	47.6

*Oxygen administration attempted, response poor, discontinued.

During the period of pressure therapy, preparations were made to combat shock. Particular attention was paid to the lung fields, not only because of the probability that large amounts of gas were trapped in the pulmonary vessels, but because of the elevated partial pressure of oxygen which, over a period of many hours, exceeded 760 mm Hg. The effort was made early in treatment to give adequate fluid by mouth. However, after 22 hours, there was some degree of hemoconcentration (hematocrit, 57 ml per 100 ml; red blood cells 5,800,000 per cu mm; white blood cells, 15,300 per cu mm). The specific gravity of the urine, which had to be removed by catheter, was 1.027. At the end of the 48-hour period of pressure therapy, the hematocrit and red blood cell count had returned to normal. To ease severe pain and apprehension, Demerol hydrochloride and Equanil (meprobamate) were administered at regular intervals.

The initial examination immediately after a pressure equivalent depth of 165 feet had been attained revealed a young man with paralysis of the lower extremities, a greatly enlarged right arm (about twice normal size) in a position of extension with the hand limp. The biceps, however, felt firm as though contracted, and the flexor muscles of the forearm had a consistency of unyielding hardness, apparently the result of interstitial edema. The radial pulse was full and bounding. The patient suffered from excruciating pain in both arms, especially the right, and in the region of the upper thorax and neck. Despite these serious signs and symptoms, he was coherent, well oriented, and

showed no impairment of special senses, particularly vision. He was able, for example, to read a pressure gage accurately at some distance. Especially favorable were the facts that the lung fields were clear and the heart beat regular. Throughout the entire 48-hour period of treatment both blood pressure $\left(\frac{110 \text{ to } 120 \text{ mm Hg}}{70 \text{ to } 80}\right)$ and pulse rate (84 to 100) indicated excellent cardiac function. The respiratory rate was increased but respiration was adequate, despite apparent weakness of intercostal musculature.

A definitive neurologic examination 22 hours after the beginning of recompression revealed severe generalized weakness of both lower extremities, the left leg being far weaker than the right. There was moderate generalized weakness of both upper extremities. Unsustained ankle clonus and a positive Babinski reflex were present on the left side. Vibration sensation was absent in both lower extremities at the iliac crest and below. Position sense was absent in the toes of both feet and diminished in both hands. In both lower extremities and trunk there was considerable impairment of pin sensation, more marked on the right side below the level of the second thoracic vertebra. In the forearms there was also a definite decrease in pin sensation. Cranial nerves were normal. It was evident that multiple lesions were present throughout the spinal cord, especially in the thoracic region.

Re-evaluation 36 hours after the accident, with the patient lying on a stretcher in the compression chamber, revealed some slight improvement in strength in the lower extremities. Below the level of the fourth to fifth thoracic vertebrae, pin and temperature sensation were more impaired on the right side, and position and vibration perception more impaired on the left. All sacral sensory segments were involved. Bilateral Babinski signs were present. The patient had neither a sense of bladder fullness nor an urge to void. Catheterization was necessary.

The patient was removed on a stretcher from the recompression chamber 48 hours after his entry. He was transferred to a nearby university hospital, where the examinations were essentially as described above. The pulse rate was 90; blood pressure, 110/80 mm Hg; and respiration rate, 22. There was still weakness of the intercostal musculature. The vital capacity was reduced to 1.8 liters. A roentgenogram of the chest and an electrocardiogram were normal. The hemoglobin was 15 grams per 100 ml and the hematocrit was 46 ml per 100 ml. Over the next 3-day period there was a gradual decrease in the swelling of the right arm and a return of strength and sensation in both upper extremities. Eight days after the accident, only minimal weakness remained in the left upper extremity. There was no respiratory impairment, and vital capacity was 3.5 liters. The patient was still paraparetic, with the left leg much weaker than the right. Sensory impairment was present below the level of the eighth to ninth thoracic vertebrae. Bladder sensation returned slowly. The patient was able to void spontaneously on the 13th day following the accident, at which time the Foley catheter was removed. Rectal sphincter control returned on the 16th day.

The patient made slow progress during the course of physical therapy, which was directed to passive and active muscular exercise to counteract the restrictions present. One month after the accident, severe impairment of function in both lower extremities was still present. He was able to stand with the help of parallel bars, but walking with crutches was difficult.

Three months after the injury the patient, accompanied by his bride of 2

months, visited the U.S. Naval Radiological Defense Laboratory seeking permission to re-engage in diving activities. His interval history indicated accelerated recovery from the earlier signs and symptoms of extensive spinal cord injury. However, the patient complained of the following pertinent symptoms: difficulty in walking in the dark without the help of objects to guide him; numbness of the feet, with some evidence of impaired proprioceptive sensation when walking; and impairment of temperature sensation of the right side including the lower extremity, with paresthesia and hyperesthesia in the upper thoracic, axillary area. The fact that there was no impairment in bladder, bowel, or genital function is noteworthy. A physical examination confirmed the above statements. The appearance of the patient was good and his weight (60.6 kg), was only 2.6 kg less than his normal weight. He walked unaided, was able to climb stairs, but gait stance was widened, and there was some degree of spasticity and unsteadiness. He was not able to engage in running exercise. Romberg's sign was positive, and there was clonus of both ankles. Achilles tendon and patellar reflexes were hyperactive. Table examination further revealed that although muscular function of upper and lower extremities was adequate for voluntarily controlled movements, there was limitation of ability to lift the left leg more than 70°, due to a "tightening-up" of muscles. There was also impaired coordination of both legs when the heel of the foot was moved distally along the crest of the tibia. Temperature and pain sensation on the left side were impaired distal to the tenth thoracic vertebra and the impairment extended along the lower extremity to the foot. Essentially, signs and symptoms, now greatly diminished, were nonetheless remarkably anamnestic of the initial condition following injury.

Anthropometric measurements were made of various girths, each converted independently into equivalent weights by a method introduced by Behnke, Guttentag and Brodsky[1] for the purpose of estimating the relative size of various parts of the body. Thus, each dimension can be translated into a "body radius (R)" by application of constants derived from group relationships. From the radii so computed, body weights may be calculated from $\pi R^2 h$, where h is stature. In the case of this patient, the following equivalent body weights (kg) calculated from the measured trunk and limb circumferences were compared with actual body weight (60.6 kg) recorded on a platform scale: shoulders (61.9), chest (61.7), biceps (63.7), forearm (60.9), waist (61.0), buttocks (59.6), thigh (55.9), knee (62.2), calf (61.0), ankle (61.1), and wrist (59.7). The findings were those consistent with the build of a lean, muscular young man whose various body measurements indicated nearly perfect symmetry when compared with a standard based upon average group values. Only the thigh girth was reduced (significant at the 1 percent level) and this may have indicated some degree of atrophy.

Finally, in regard to the matter of re-engaging in SCUBA diving, the patient was advised to wait until he was able to indulge in running exercise!

PERTINENT REFERENCES TO NEUROLOGIC INJURY

A review of the neurologic complications of decompression sickness reveals that there has been a remarkable lack of cerebral involvement even under conditions of widespread embolism. Vertigo, deafness, visual disturbances, convulsions, and physic changes have been reported, but permanent lesions of the brain are rare. The most serious

and most frequent neurologic complication involves spinal cord function. In 1900, Heller, Mager and von Schrötter [2] listed 26 men who within 30 minutes after rapid decompression developed spastic paralysis and sensory disturbances in the lower extremities, along with bladder and bowel impairment. In several cases, impairment of either one or both arms was also noted.

Thorne [3] examined 300 patients with caisson disease at the Queens midtown tunnel project. He found 3 persons with hemiplegia and 2 with monoplegia. The 14 patients who developed rectal and urinary incontinence included 5 with numbness of both legs, 2 with paralysis of both legs, 4 with severe weakness of both legs, and 3 with both motor and sensory disturbances in the lower extremities. Paton and Walder [4] described several cases of paralysis in caisson workers. Johnson [5] reported that a skin diver developed paraplegia and sensory disturbance at the level of the tenth thoracic vertebra with concomitant bladder and bowel impairment. Recompression begun some 10 hours after the accident was not beneficial. Five months later there was residual paralysis.

Taylor, Santos and Behnke [6] recently described a case of a professional diver who, after 2 dives to 135 feet, developed spinal cord involvement, and some 20 months later still had sensory impairment below the fourth thoracic vertebra on the right side and intermittent clonic spasms of the left lower extremity. In his source book on diving and submarine medicine, Hoff [7] refers to many other case reports and reviews spinal cord involvement in decompression sickness. Spinal cord lesions have been produced experimentally. Dogs rapidly decompressed from high pressures and then only partially recompressed (to a degree that prevents death from asphyxia) usually develop paralysis of the hind legs, footdrop, a spastic, wide-based gait, and paralysis of the bladder musculature.[8]

DISCUSSION

The most common area of the spinal cord to be involved in decompression injury is the thoracic region and infrequently the upper lumbar and lower cervical regions. The thoracic spinal cord is supplied by small spinal branches of the intercostal and lumbar arteries (aortic circulation) and by anastomotic twigs from vessels supplying the cervical and lumbar enlargement. The anterior spinal artery trunk is made up of anastomosing ascending and descending branches of the anterior radicular arteries. The diameters of these vessels as shown in table 2 are very small when compared with their size in the cervical and lumbar region.[9] Furthermore, we usually find anterior

radicular arteries only at the 5th and 10th thoracic segments, thus leaving the area in between particularly vulnerable to compromise by the presence of air emboli. Behnke [10] has stated that the preponderance of evidence points to intravascular bubbles as the chief cause of the syndrome of decompression sickness. In a study of frozen dried spinal cords of animals decompressed from increased pressures, Gersh and Catchpole [11] found bubbles only in vessels of the spinal cord. Haymaker and Johnston [12] have suggested that some of the nitrogen bubbles from the retroperitoneal fat depots may enter the spinovertebral plexus of veins and block venous return from the cord. The stasis so produced may also precipitate embolization of the spinal precapillaries and arterioles. In pathologic specimens reviewed by Lichtenstein and Zeitlin,[13] among others, it has been observed that the lesions predominate in the central portions of the white matter with the lateral and posterior columns affected most frequently.

Table 2. ***Number and caliber of the spinal arteries in various regions of the spinal cord in adult man.*** ***(From Suh and Alexander [9])***

Region of spinal cord	Number of significant anterior radicular arteries	Diameter of significant anterior radicular arteries (microns)	Diameter of anterior arterial spinal trunk ("anterior spinal artery") (microns)
Upper cervical	1	510	510
Lower cervical	1	578	442
Upper thoracic	2	374	374
Middle thoracic	1	340	340
Lower thoracic	1	510	578
Lumbar	1	872	1,122

In our case, since the duration of the dive was too short for appreciable quantities of gas to dissolve in the tissues of the spinal cord, it is probable that intravascular bubbles produced embolization and damaged the white matter, particularly in the mid-thoracic region. Clinically, involvement was greater on the left side, but evidence of pyramidal tract, dorsal column, and lateral spinothalamic tract involvement was present bilaterally.

SUMMARY

1. A case is reported of a skin diver who developed severe spinal cord involvement after ascending too rapidly from a depth of 350 feet. He was placed in a recompression chamber some 2 hours after his accident and remained there for 48 hours.

2. Following recompression, gradual improvement in strength and

sensation of upper extremities was noted, but considerable residual weakness, spasticity and sensory loss remained in the lower extremities 1 month after the accident.

3. Three months following the injury the patient was able to walk unaided. There were no genitourinary disturbances. Residual proprioceptive and cutaneous sensory disturbances, however, were present.

4. The recompression treatment in this case was directed specifically at maintaining pressure over a long enough period of time so that residual bubbles could be compressed and resorbed and at the same time oxygen supplied at increased partial pressure to the damaged tissue of the spinal cord.

5. Emphasis is placed on the value of physiotherapy systematically directed to overcome, by passive and active muscular exercises, limitation of joint movements.

6. A new method of evaluating the relative size of different muscle groups of the body to detect atrophy has been applied in the final examination of the patient.

7. The general recovery from the serious spinal cord injury was remarkable.

ACKNOWLEDGMENT: The diving emergency brought into immediate action units from the U.S. Coast Guard and Army. The prompt helicopter transport from the 33d Army Aviation Company, Fort Ord, to the scene of the accident in Monterey Bay and the subsequent flights to the Naval Dispensary, Post-Graduate School, Monterey, and then to San Francisco, were accomplished with unusual dispatch and skill. Prevention of further expansion of bubble emboli required low flying in a congested area. If there had been any undue delay, it is likely that the diver would have been permanently paralyzed. The fact that he is now walking and able to engage in normal activities is due, therefore, in large measure to the prompt and well-executed logistic services performed by Lieutenant J. D. Horne and Chief Warrant Officer Leland Cole, U.S. Army, who piloted the helicopter.

To the Navy men of the diving barge we again express appreciation for the faultless operation of recompression facilities.

In any operation, however, there is always the untoward event which may prove disastrous. In this case, the rolling and pitching of the diving barge caused by stormy weather could have severed power and mooring lines with subsequent fatalities. It is our pleasure to acknowledge the vigilance and continuous enforcement of special safety measures by civilian workers of the San Francisco Naval Shipyard.

In the compression chamber, Lieutenant George Buxton, MC, USN, spent many hours caring for a difficult medical casualty.

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X-RAY IN ACNE

Roentgen therapy still has a useful place in the treatment of acne. In some cases it is the most effective method but, because of the clamor against unnecessary ionizing radiation therapy in recent years, it is being used less and less. When proper technic is used by a qualified expert, it does not cause any damage or harmful effects, but how is one to answer the charge made by some physicists that such treatment is likely to be harmful to your children's children? Fortunately, in most cases, the skillful use of a combination of antibiotics, topical preparation, diuretics, cryoslush and, sometimes, ultraviolet radiation will keep acne under control.—HERBERT RATTNER: Acne—the Situation at Present. *Postgraduate Medicine*, April 1959.

Osteochondrosis of the Capitulum Humeri (Panner's Disease)

MAJOR GEORGE E. OMER, JR., MC, USA
CAPTAIN CLYDE W. CONGER, MC, USA

OSTEOCHONDROSIS of the capitulum humeri was first recorded by Panner [1] in 1927. Laurent and Lindstrom [2] reviewed the world literature up to 1955 to collect a total of 21 cases [3-7] and added 2 more of their own. This avascular necrosis is infrequently reported and yet is common enough to merit documentation for easy recognition.

CASE REPORT

A 7-year-old Negro boy was first seen in the emergency room of this hospital on 7 October 1956, with a complaint of pain and swelling in his right elbow. History revealed he had accidentally bumped his elbow while bathing on 5 October. Physical examination revealed only tenderness over the lateral humeral epicondyle and 10° limitation of elbow extension. Roentgenograms were interpreted as normal (fig. 1). Treatment consisted of an arm sling for 5 days, and the patient was advised to refrain from strenuous arm activities such as pitching baseball. He continued to be normally active, and the elbow pain gradually subsided over a 2-week period.

Avascular necrosis of the capitulum was suspected on review of the roentgenograms and the patient was recalled to the orthopedic outpatient clinic in January 1957. Comparison films (fig. 2) demonstrated increased roughening, sclerosis, and fragmentation of the right capitulum. The patient was free of subjective symptoms referable to his right elbow and had a normal range of motion.

In March 1957, the patient complained of mild pain in the right elbow, but there was no restriction of mobility. An arm sling was again used for a few days. Roentgenograms in March (fig. 3) and June 1957 (fig. 4) showed progression of the disease and further destruction of the capitulum.

No further films were obtained until March 1958 and for the first time capitular regeneration was noted (fig. 5). The last roentgenograms were taken in October 1958, 2 years from the onset of the illness, and demonstrated excellent healing of the capitulum of the right humerus (fig. 6).

From Irwin Army Hospital, Fort Riley, Kans., Major Omer is now at 121st Evacuation Hospital (SMBL), APO 20, San Francisco, Calif.

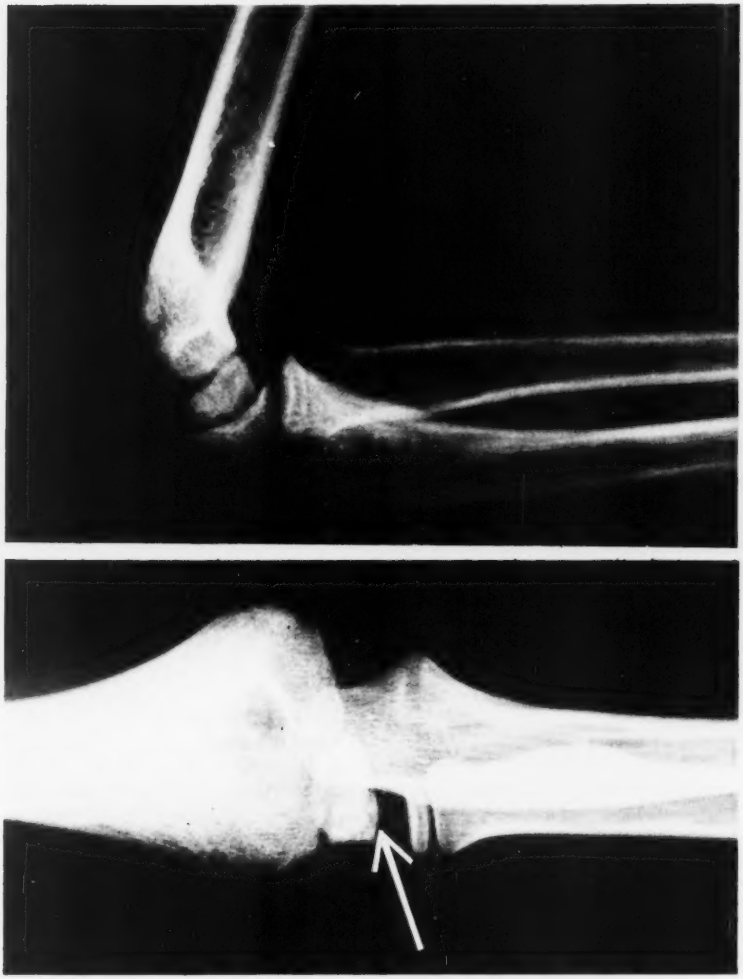

Figure 1. The roentgenogram in October 1956 was interpreted as normal but retrospective examination reveals an irregular subcortical zone of rarefaction on the anteroposterior view of the capitulum.

Figure 2. One month after onset of symptoms there is irregularity of the capitular cortex and minimal flattening of the bony mass on the lateral view.

DISCUSSION

Osteochondrosis of the capitulum humeri occurs in children 4 to 10 years of age. The average age of onset for reported cases is 8 years and it occurs almost exclusively in boys. Only 2 cases have been diagnosed in female patients. A case has been reported in which both capitula were simultaneously involved, and another where similar aseptic changes were taking place in the femoral head and the patella.[5]

The cause is unknown. Sundry indictments include trauma, infection, altered blood supply to the epiphysis, and disturbance of innervation. Growth deceleration and endocrine dysfunction as constitutional conditions affecting bony development have been considered.[8]

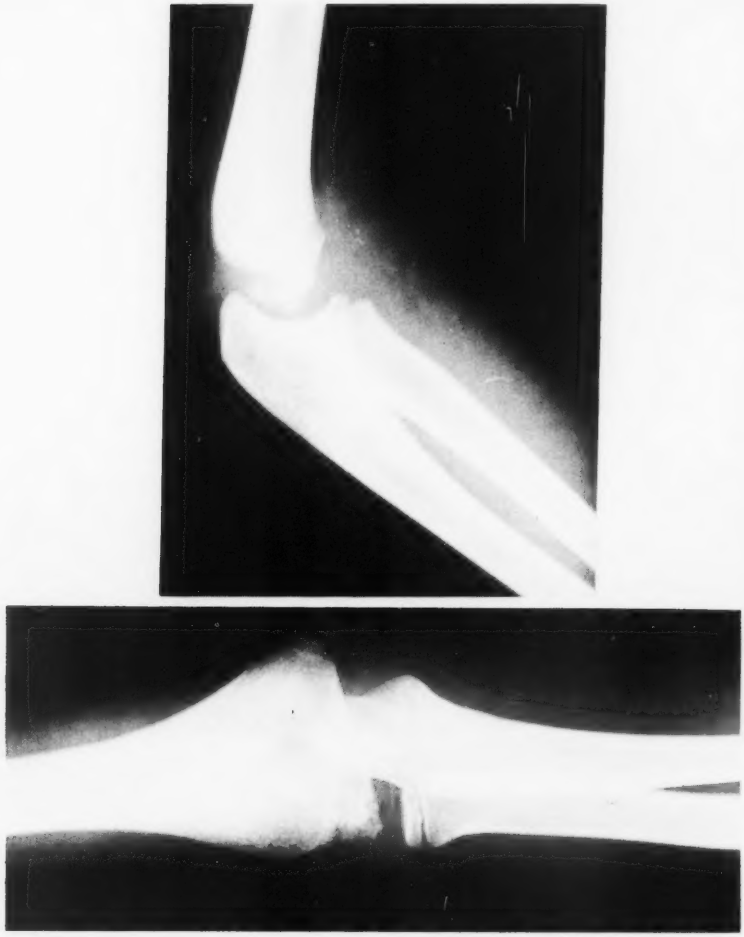

Figure 3. Roentgenogram in March 1957 demonstrates increased fragmentation and loss of normal contour.

The infrequency with which this disease is reported would suggest that it is a rare disorder. It probably occurs with greater frequency, but the significant mildness or complete absence of clinical symptoms permit the disease to escape diagnosis. There is usually a clinical history of slight trauma followed by pain and restricted elbow mobility, accompanied by minimal edema and tenderness to palpation.

Figure 4. Eight months after onset of symptoms the capitulum is almost flat on lateral view and is completely fragmented.

Extreme flexion and extension of the forearm are restricted, and forced elbow motion produces discomfort.

The roentgenograms are diagnostic. There is irregularity of the contour of the capitular epiphysis and a thinning of the cortex and subcortical zones of rarefaction. Irregular zones of bony condensation occur within the epiphysis. There may be interruptions in continuity of the cortex. In severe cases the epiphysis undergoes flattening and complete fragmentation. This may make the epiphysis appear smaller than normal and the joint space between the epiphysis and the head of the radius appear wider than normal. There is a generalized fuzzy and ragged appearance of the chondro-epiphysial structures of the elbow. As healing progresses the epiphysis gradually resumes its normal shape and contour. Comparison films of the

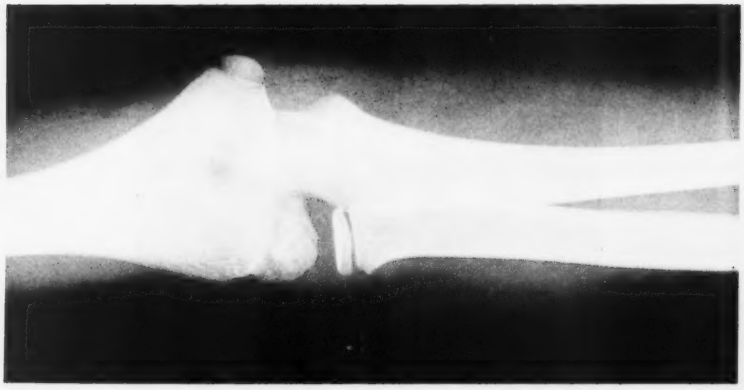

Figure 5. Roentgenogram in March 1958. The capitulum is regenerating 17 months after onset of symptoms. The cortex is irregular but has an intact contour.

normal elbow are helpful where there is evidence of old or recent injury or disease.

Treatment is nonspecific and even immobilization of the elbow seems to be of little benefit. An arm sling during the acute stage is justified, but it can be removed as soon as the pain subsides. The child and his parents should be instructed that the patient should not strain or overexercise the arm in gymnastics or athletics. All subjective symptoms usually subside in a few weeks. The benign course of the disease leads to epiphysial regeneration in the course of 1 to 3 years, with insignificant or mild deformity as a final result.

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Figure 6. Twenty-four months after onset of symptoms the capitulum is completely healed, with normal density and contour.

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Acute Intermittent Porphyria Treated With Trifluoperazine

CAPTAIN DAVID F. LEE, USAF, MC
CAPTAIN GEORGE J. LUCAS, USAF, MC

ACUTE INTERMITTENT PORPHYRIA is a fundamental disturbance of porphyrin metabolism in which abnormal amounts and kinds of porphyrin are excreted in the urine and feces. Porphyria must be distinguished from porphyrinuria, in which increased amounts of normal porphyrins are found in the urine in such conditions as hepatitis, cirrhosis, heavy metal poisoning, alcoholism, sprue, pernicious anemia, and aplastic anemia.

The earlier grouping of porphyria into congenital, acute, and chronic forms has been superseded by a more basic classification:[1]

1. Porphyria erythropoietica, in which abnormal porphyrins are formed in the developing normoblasts of bone marrow.

2. Porphyria hepatica, in which abnormal porphyrins and their precursors are synthesized in the liver.

   a. Intermittent acute type, with manifestations in abdomen or nervous system or both.

   b. Cutanea tarda type, with photosensitivity and hepatic dysfunction.

   c. Mixed type.

Acute intermittent porphyria, the most common form of porphyria, is inherited as a mendelian dominant.[2] Affecting females more often than males, the disease usually becomes manifest between 20 and 40 years of age.[3] The outstanding feature of the disorder is its intermittence. Abdominal manifestations often simulate an acute intestinal, biliary, or renal condition, and it is not unusual for patients to display the scars of numerous exploratory laparotomies. Jaundice may occur and liver damage may be demonstrated by laboratory tests. Nervous manifestations may be central, peripheral, autonomic, or psychic, and may simulate a variety of neurologic, psychoneurotic, or psychotic conditions. Patients may have a long history of "nervousness" antedating acute attacks, and many observers believe there is a

From U.S. Air Force Hospital, Sheppard Air Force Base, Texas. Dr. Lee is now at 3557 Wosley Drive, Fort Worth, Texas.

nervous background for this disease. Transient hypertension, tachycardia, retinal vascular spasm, and oliguria have been observed.[1] Skin pigmentation develops in some patients. The diagnosis of acute intermittent porphyria is often difficult, and attacks may be mistaken for acute surgical abdomen, hypertension, constipation, psychoneuroses, psychoses, hyperthyroidism, or Addison's disease. In the presence of neurologic symptoms, the prognosis is grave, with an immediate mortality rate of 50 to 75 percent.[4]

The following case of acute intermittent porphyria is reported because it is believed to be the first time trifluoperazine was used in this condition. The drug was chosen because of its observed effect on hallucinations and its potency in low dosage.

CASE REPORT

A 29-year-old airman was admitted to U.S. Air Force Hospital, McConnell Air Force Base, on 30 December 1958, because of low back pain which radiated down the posterior aspect of both legs. Physical examination on admission revealed moderate spasm of the lumbar paraspinal muscles; otherwise the findings were normal.

Shortly after admission, the patient was given 200 mg of Luminal (phenobarbital) sodium to induce sleep and rest. The following morning he developed severe cramping abdominal pain. Repeated examinations failed to reveal any objective signs. The patient continued to complain of severe abdominal pain. At one time he did not have a bowel movement for several days, even when given enemas, and obstruction was suspected. There were no significant physical findings for this, however, and roentgenograms failed to show any small bowel distention. The patient was having abdominal and back pain daily and was becoming more withdrawn and acutely depressed. He refused to eat solid food and took only a minimum of fluids by mouth.

On 16 January 1959, the patient was transferred to this hospital with a diagnosis of psychotic depressive reaction. On arrival he was semicomatose and very dehydrated. His depression and withdrawal were believed to be a result of oversedation as well as dehydration. The patient's blood pressure was 150/120 mm Hg and his pulse rate was 100. Physical examination revealed an appendectomy scar and generalized hypoactive reflexes. Funduscopic examination revealed extremely spastic and tortuous vessels; there were no hemorrhages or exudates. The rest of the physical examination was within normal limits.

Past history revealed that the patient had had the usual childhood illnesses. He had been quite nervous all his life. He had had two previous hospitalizations. The first was in 1944, when he had acute abdominal pain associated with nausea and vomiting. His appendix was removed at that time. The second was in 1956, when he was hospitalized for abdominal pain with nausea and diarrhea. He was discharged with a diagnosis of acute gastroenteritis. He had had episodes of abdominal pain, concomitant with the passage of dark red-colored urine, since he was 7 years old. The remainder of the past history was noncontributory. The family history was negative for porphyria symptoms or for any mental or nervous disease.

Laboratory studies revealed the urine to be amber colored, and routine analysis was negative. The urine was positive for porphobilinogen by the Watson-Schwartz test on three occasions. The white blood cell count was 14,400 per cu mm with a normal differential and the hemoglobin was 16 grams per 100 ml. The blood urea nitrogen was 17 mg per 100 ml. The serum carbon dioxide combining power was 29.5 mEq per liter; serum chlorides, 140 mEq per liter; sodium, 140 mEq per liter; potassium, 4.2 mEq per liter; and the alkaline phosphatase was 4 units. A serologic test for syphilis was negative. The sedimentation rate was 4 mm per hour. The sulfobromophthalein sodium test gave 25 percent dye retention. The urinary zinc excretion level was 0.998 mg per liter of urine per 24 hours. A roentgenogram of the chest was normal. A roentgenogram of the lumbar spine showed a spina bifida occulta of the first sacral segment. An intravenous pyelogram was normal. An electrocardiogram showed sinus tachycardia and S–T segment elevation, V_2–V_5.

On admission to this hospital, the patient was given 3,000 ml of fluids intravenously, and the next morning he was alert and could take oral feedings. He complained of severe, abdominal, cramping pain and began having visual and auditory hallucinations. He was anorectic and had insomnia. The first hospital day his urinary output was only 440 ml in spite of adequate fluid intake. On the second day he continued to have anorexia, oliguria, and hypertension; he complained bitterly of abdominal pain; visual hallucinations caused him to scream with fright; and he was very depressed. The patient was started on trifluoperazine, 10 mg twice a day, orally. Twenty-four hours later he was hungry for the first time since he had been in the hospital. Forty-eight hours later, his abdominal pain and hallucinations disappeared, and after 72 hours, his urinary output and blood pressure were normal. After 4 days the patient was completely without signs or symptoms except for being nervous, which was normal for him.

The patient was maintained on 10 mg of trifluoperazine per day for 6 days. Five days after the drug was discontinued, the patient again complained of severe abdominal pain. Trifluoperazine was started again, and 24 hours later the patient was without symptoms. Since then his maintenance dose has been 5 mg twice a day and he has had no symptoms attributable to porphyria for 5 months.

DISCUSSION

The treatment of porphyria has been consistently frustrating. No therapy will cure the victim of his illness. Patients with acute, intermittent porphyria should not use alcohol or barbiturates. The ability of these compounds to induce crises is corroborated by their ability to increase excretion of porphyrins.[3]

The difficulty in evaluating any therapy in this illness lies in the principal characteristic of porphyria—intermittence. Many agents have been used to treat this condition, all claiming some success, including chelating agents such as BAL and EDTA (ethylenediaminetetraacetic acid)[5]. Other agents used include corticotropin and cortisone, procaine hydrochloride, Urecholine (bethanechol) chloride, and hexamethonium. Monaco and associates[6] treated four patients with chlorpromazine hydrochloride and described this as the "single

most effective agent introduced thus far in the control of abdominal pain and nervousness observed in acute, intermittent porphyria." Klatzko [7] described a patient successfully treated with prochlorperazine.

We were confident that trifluoperazine would be useful in treating our patient because, like chlorpromazine and prochlorperazine, this drug contains a phenothiazine nucleus and is an autonomic suppressant. The mode of action of trifluoperazine is unknown, but it may be the same as that of chlorpromazine. Watson [8] believed that chlorpromazine ameliorated certain autonomic disturbances and also interrupted the vicious cycle of pain which caused nervousness, thus permitting a spontaneous remission.

Many observers [9] believe that by replacing chloride with a fluoride on the phenothiazine drug, a more potent tranquilizing drug is produced. We believe that our patient's good response was to the drug and not to a spontaneous remission of the illness. The patient's condition was becoming worse when the drug was started, and 72 hours later he was symptom free. The drug was withdrawn after 2 weeks, and the patient again developed acute, abdominal pain which was arrested 24 hours after the drug was resumed.

SUMMARY AND CONCLUSIONS

A patient with established, acute, intermittent porphyria was treated effectively with trifluoperazine. From 10 to 20 mg was administered orally each day. Some patients may require continuing therapy on a maintenance basis. Many of the salient features of the disease are presented. We believe that trifluoperazine is a valuable addition to the drugs known to be effective in arresting the symptoms of acute intermittent porphyria. It may prove to be the drug of choice in control of this disease.

ACKNOWLEDGMENT: Stelazine (trifluoperazine) was furnished by the Smith Kline & French Laboratories, Philadelphia, Pa.

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RETRACTION IN SCIENTIFIC LITERATURE

No one who has published a large number of papers is ever satisfied with all of them and there is usually one or more which the author has later wished that he had never written. Most of these papers were honestly thought out and carefully presented: but some later development revealed a grievous flaw, either in the thinking or in the process, which led to its abandonment. The literature, however, still records the material as presented. On a rare occasion the author may present a follow-up paper pointing out the deficiencies in his article, or on occasion this may be accomplished by some other author's publication. Many physicians, however, may not come in contact with these articles and may continue the method of treatment of the original paper long after its author and others have decided that the concept has no merit. . . . I recently saw such a retraction published in the *New England Journal of Medicine*, which is one of the few journals which follow this plan. It is my suggestion that a section of each of today's numerous medical journals be reserved for just such retractions.—KENNETH E. LEMMER: Responsibility of Authorship. *Wisconsin Medical Journal*, March 1959.

Military Medical News

AVIATION CARDIOLOGY SYMPOSIUM MARKS DEDICATION OF USAF AEROSPACE MEDICAL CENTER 12–14 NOVEMBER

The first International Symposium on Cardiology in Aviation will be held at the new U.S. Air Force Aerospace Medical Center at Brooks Air Force Base, San Antonio, Texas, 12–13 November under the sponsorship of the Air Force School of Aviation Medicine, the Aerospace Medical Association, and the Airline Medical Directors Association. The Center, which was established on 1 October, includes medical teaching and research facilities at the School of Aviation Medicine, Brooks Air Force Base, the U.S. Air Force Hospital and the U.S. Air Force Epidemiological Laboratory, Lackland Air Force Base, Texas, and the Gunter branch of the school at Gunter Air Force Base, Alabama.

Gen. Benson

Dr. Burney

Dr. Lederer

Dr. Wight

Formal dedication of the new buildings of the School of Aviation Medicine will be held at Brooks Air Force Base on 14 November, Major General Otis O. Benson, Jr., has announced. Among the distinguished persons expected to attend the ceremonies are Senator Lyndon Johnson and Representative Paul J. Kilday, Air Force Surgeon General Oliver K. Niess, Dr. Leroy E. Burney, surgeon general of the U.S. Public Health Service, Dr. Ludwig G. Lederer, Washington, D.C., president of the Aerospace Medical Association, and Dr. G. Earl Wright, Montreal, president of the Airline Medical Directors Association.

Participants in the symposium will attend a dinner at the Hilton Hotel on 12 November when Dr. Burney will speak on "The National Program for Study of Cardiovascular Disease." The complete program of the symposium follows:

INTERNATIONAL SYMPOSIUM ON CARDIOLOGY IN AVIATION

Thursday, 12 November 1959

Welcome and Introduction—Major General OTIS O. BENSON, JR., USAF, MC, Commandant, U.S. Air Force School of Aviation Medicine.

Historical Background of Cardiology in Aviation—Captain ASHTON GRAYBIEL, MC, USN, U.S. Naval School of Aviation Medicine.

Influence of Aerospace Flight on the Normal Cardiovascular System—Stresses and Effects—LAWRENCE E. LAMB, M.D., U.S. Air Force School of Aviation Medicine.

CARDIOVASCULAR TECHNICS USED FOR FLYING PERSONNEL

Howard B. Burchell, M.D., Mayo Clinic, presiding.

Phonocardiography—E. GREY DIMOND, M.D., University of Kansas Medical Center.

Ballistocardiography—JOHN E. SMITH, M.D., Federal Aviation Agency.

Vectorcardiography—LAWRENCE E. LAMB, M.D., U.S. Air Force School of Aviation Medicine.

Telemetry—Captain NORMAN L. BARR, MC, USN, Bureau of Medicine and Surgery.

CARDIOVASCULAR DISORDERS IN AIRCREW PERSONNEL

Brigadier General M. S. White, USAF, MC, Air Training Command, presiding.

Pathological Findings in the Cardiovascular System of Pilots—Colonel FRANK M. TOWNSEND, USAF, MC, Armed Forces Institute of Pathology.

The Cardiovascular System of the Aging Pilot—Brigadier General OTIS B. SCHREUDER, USAF, MC (ret.), Pan American World Airways.

The Problem of Elevated Blood Pressure or Hypertension in the Pilot—LAWRENCE E. LAMB, M.D., U.S. Air Force School of Aviation Medicine.

Prognosis in Cardiovascular Findings, Based on Life Insurance Statistics—HARRY E. UNGERLEIDER, M.D., North American Reassurance Company.

The Problem of Unexplained Loss of Consciousness in Flying Personnel—GEORGE DERMKSIAN, M.D., St. Luke's Hospital, New York, N.Y.

CARDIOVASCULAR DISEASES IN THE FLYER—PANEL DISCUSSION

Topics: Aviation Aspects of Arterioscelerotic Heart Disease, Hypertensive Cardiovascular Disease, Congenital Heart Disease, Rheumatic Heart Disease, Pericarditis.

Participants: LAWRENCE E. LAMB, M.D., *Moderator;* HOWARD B. BURCHELL, M.D.; ROBERT P. GRANT, M.D.; Captain ASHTON GRAYBIEL, MC, USN; Colonel ARCHIE A. HOFFMAN, USAF, MC; SIBLEY W. HOOBLER, M.D.; GEORGE W. MANNING, M.D.; FRANCIS A. L. MATHEWSON, M.D.; and JOHN E. SMITH, M.D.

Friday, 13 November 1959

ELECTROCARDIOGRAPHIC STUDIES OF FLYING PERSONNEL—U.S. AIR FORCE SURVEY OF 72,000 ELECTROCARDIOGRAMS

Colonel Herbert W. Coone, USAF, MC, Office of the Air Force Surgeon General, presiding.

Normal Values and Incidence of Pathology—KEITH H. AVERILL, M.D., University of Michigan Medical Center.

U.S. Navy Experiences in Electrocardiographic Evaluation—Captain ASHTON GRAYBIEL, MC, USN, U.S. Naval School of Aviation Medicine.

The Royal Canadian Air Force Experiences in Electrocardiographic Evaluation—GEORGE W. MANNING, M.D., consultant to the Royal Canadian Air Force.

G. Earl Wight, M.D., President, Airlines Medical Directors Association, presiding.

Supraventricular Rhythms—KEITH H. AVERILL, M.D., University of Michigan Medical Center.

Ventricular Rhythms—Captain ROLAND G. HISS, USAF, MC, U.S. Air Force School of Aviation Medicine.

Atrio-ventricular Block—Major ROBERT L. JOHNSON, USAF, MC, U.S. Air Force School of Aviation Medicine.

Colonel Archie A. Hoffman, USAF, MC, Commander, USAF Hospital, Andrews Air Force Base, presiding.

The Wolff-Parkinson-White Syndrome—KEITH H. AVERILL, M.D., University of Michigan Medical School.

Complete Right Bundle Branch Block—Major ROBERT L. JOHNSON, USAF, MC, U.S. Air Force School of Aviation Medicine.

Complete Left Bundle Branch Block—LAWRENCE E. LAMB, M.D., U.S. Air Force School of Aviation Medicine.

Ludwig G. Lederer, M.D., President, Aerospace Medical Association, presiding.

T-wave Variations—Captain ROLAND G. HISS, USAF, MC, U.S. Air Force School of Aviation Medicine.

Myocardial Infarction—Major GEORGE B. SMITH, JR., USAF, MC, U.S. Air Force School of Aviation Medicine.

ELECTROCARDIOGRAPHIC INTERPRETATION IN STRESS TOLERANCE TEST

E. Grey Dimond, M.D., University of Kansas Medical Center, presiding.

Discussants: Captain ASHTON GRAYBIEL, MC, USN, and GEORGE W. MANNING, M.D.

LIMITS OF CARDIOVASCULAR NORMALITY FOR FLYING—PANEL DISCUSSION

Lieutenant Colonel Frederick S. Spiegel, USAF, MC, Office of the Air Force Surgeon General, presiding.

Participants: Captain ASHTON GRABIEL, MC, USN; LAWRENCE E. LAMB, M.D.; LUDWIG G. LEDERER, M.D.; GEORGE W. MANNING, M.D.; FRANCIS A. L. MATHEWSON, M.D.; JOHN E. SMITH, M.D.; and JAN H. TILLISCH, M.D.

Concluding Remarks—Major General OTIS O. BENSON, JR., USAF, MC, Commandant, U.S. Air Force School of Aviation Medicine.

CAPT. BEHNKE RETIRES

Captain Albert R. Behnke, Jr., MC, USN, whose scientific research has helped make possible safe diving operations at great depths, and improved the treatment of decompression illness in divers and caisson workers, retired on 31 July after 30 years of naval service.

Captain Behnke

A graduate of Stanford University School of Medicine, Captain Behnke entered the Navy as a lieutenant (jg.) in 1929. One of his first assignments was to the staff of a commander of a submarine division, where he became intensely interested in submarine medicine and deep diving. In 1932, following an assignment at New London, Conn., he took postgraduate instruction in physiology at Harvard. He became medical and diving officer at the submarine base in Pearl Harbor, in 1935, and two years later was assigned to the Experimental Diving Unit in Washington, D.C. As an instructor at the Naval Medical School in 1938, he continued to serve with the diving unit and assisted in the rescue of the crew and the salvage of the submarine *Squalus*, in 1939 at Portsmouth, N.H.

In 1942, Captain Behnke was assigned to the Naval Medical Research Institute in Bethesda, Md. He served as assistant naval attache for medical intelligence in London, England, from 1945 to 1946, and then returned to Bethesda as executive officer of the Naval Medical Research Institute. In 1950 he joined the staff of Commander Naval Forces, Germany, for medical intelligence duty, and in 1952 became staff medical officer of Commander Submarine Force, U.S. Atlantic Fleet. His last assignment was as radiological medical director, Naval Radiological Defense Laboratory, San Francisco, Calif.

A.M.A. RESOLUTION

The House of Delegates of the American Medical Association, meeting in Atlantic City in June, adopted the following resolution:

Whereas, The Council on National Defense of the American Medical Association sponsors a National Medical Civil Defense Conference each year on the Saturday preceding the opening of the Association's annual meeting: and

Whereas, The presentation of its condensed one-day version of the one-week course on the Management of Mass Casualties was an outstanding contribution to medical education for disaster: and

Whereas, Such disaster medical information as was presented should be widely disseminated to members of the medical profession: therefore be it

Resolved, That the American Medical Association express its appreciation for the outstanding disaster medicine program presented by the United States Army Medical Service and that a copy of this resolution be transmitted to the Secretary of Defense and the Secretary of the Army.

3-STAR SURGEON GENERAL.—Army Surgeon General Leonard D. Heaton receives the insignia of lieutenant general from Secretary of the Army Wilbur M. Brucker and Mrs. Heaton, in promotion ceremonies on 9 September. General Heaton is the first Surgeon General of the Army to hold three-star rank. While commanding general of Walter Reed Army Medical Center, he operated on President Eisenhower and since becoming Army Surgeon General in June 1959, has maintained an active professional schedule at Walter Reed.

Official Decorations

The following awards were recently announced by the Departments of the Army and Air Force.

Legion of Merit

Marshall E. Groover, Jr., Col., USAF, MC
Inez Haynes, Col., NC, USA
Charles H. Morhouse, Col., USAF, MC*
Francis W. Pruitt, Brig. Gen., MC, USA*
Dale B. Ridgely, Brig. Gen., DC, USA
Elmer W. Young, Brig. Gen., VC, USA*

Army Commendation Ribbon with Metal Pendant

Allen J. Blake, Col., MSC, USA
Lavern G. Borg, Capt., MSC, USA
Richard A. Grundler, Lt. Col., DC, USA
David C. Hazard, Col., DC, USA
Maurice W. Hylden, Maj., MSC, USA
Edward G. Sion, Col., MC, USA
William L. Warren, Capt., MC, USA

*First oak leaf cluster

ARMY VETERINARIANS. The largest group of veterinarians to enter the Army in peacetime, these forty officers recently completed a military orientation course at the Army Medical Service School. Colonel Daniel S. Stevenson, director, and Lieutenant Colonel Mulford C. Lockwood, assistant director of the department of veterinary science at the school, are in the first row in summer shorts.

Officers Certified by Specialty Boards

The surgeons general of the military medical services have announced that the following regular Medical Corps officers have been certified by the specialty boards indicated.

American Board of Obstetrics and Gynecology
Wiegand, Frederick G., Comdr., USN

American Board of Otolaryngology
Valusek, Fred A., Comdr., USN

American Board of Radiology
George, Frederick W., II, Comdr., USN

American Board of Surgery
Hughes, William F., Lt. Comdr., USN
Yon, Joseph L., Capt., USN

Thoracic Surgery
Hering, Alexander C., Comdr., USN

EXCURSIONS TO GREENLAND

In a guest editorial for the july *A.M.A. Archives of Internal Medicine*, entitled "The Arctic—A Place to Live and Work," Captain Alan D. Matzger, MC, USAR, stationed at the U.S. Army Medical Research Laboratory, Fort Knox, Kentucky, predicts that summer excursions across Greenland's arctic ice cap may someday be no more dangerous than a vacation spent camping out in the Sierras—when more is learned about the region and its effect on man's health. Captain Matzger spent the summer in Greenland, providing medical support for Army engineers near Thule.

Progress Notes

Major **Wayne R. Otto,** MC, USA, and Captain **Carl E. Wilbur,** MC, USN, have been assigned to the staff of the civil air surgeon of the Federal Aviation Agency, Washington, D.C., and chiefs of the rules and procedures branch and of the accident studies branch, respectively, in the medical standards division . . . Captain **Glenn W. Berry,** DC, USN, recently retired after 31 years of service. His last assignment was as district dental officer, Fifth Naval District, Norfolk, Virginia . . . Lieutenant Colonel **Albert B. Hunt,** MSC, USA, has been named comptroller of Walter Reed Army Medical Center, succeeding Lieutenant Colonel **Manley G. Morrison,** MSC, USA, who has been transferred to the Army War College, Carlisle Barracks, Pennsylvania. Colonel Hunt was chief of the comptroller subjects branch, Army Medical Service School, Fort Sam Houston, Texas.

Thailand's "Most Exhalted Order of the White Elephant, fifth class," has been awarded to **Mrs. Paul F. Austin.** An Army reserve nurse and wife of a Joint United States Military Advisory Group member, she was cited for nursing Thailand's premier, Field Marshal Sarit, to a successful recovery following a serious operation . . . Captain **Oscar Schneider,** MC, USN, executive secretary of the coordinating committee of medical sciences, Office of the Assistant Secretary of Defense (Research and Engineering), has been assigned as a member of the Navy Physical Disability Review Board, Washington, D.C. . . Major **Cordelia Myers,** AMSC, USA, succeeded Lieutenant Colonel **Myra L. McDaniel,** AMSC, USA, as chief of the occupational therapist section and assistant chief, Army Medical Specialist Corps, office of the Army surgeon general, on 1 October.

Captain **Claud M. Fraleigh,** DC, USN, a Japanese prisoner of war for three years during World War II who received the Silver Star Medal for gallantry in action on Bataan Peninsula, retired recently after 20 years of service in the rank of rear admiral to join the staff of the dental school at the University of West Virginia . . . Colonel **Robert J. Benford,** USAF, MC, director of the Armed Forces Medical Publication Agency and editor of the *Armed Forces Medical Journal,* attended the General Assembly of the World Medical Association in Montreal, Canada, 7–12 September, as Department of Defense representative . . . Commander **William G. Krech,** MC, USN, U.S. Naval Hospital, Newport, Rhode Island, has been elected as a fellow in the American College of Surgeons.

Major General **Oliver K. Niess,** USAF, MC, surgeon general of the Air Force, will be a featured speaker at the ninth annual Pacific Air Forces Medical Conference at John Hay Air Base, P.I., 29 November through 2 December . . . Major **Ervin L. Sanders,** MSC, USA, former chief of military personnel at Walter Reed Army Medical Center, has been assigned as chief of classification and assignment section, Personnel and Training Division, office of the Army surgeon general . . . **Mae Mills Link, Ph. D.,** special assistant for historical affairs and technical information, office of the Air Force surgeon general, has replaced Lieutenant Colonel **Raymond L. Towne,** USAF, as chairman of the publicity committee for the Association of Military Surgeons' 1959 meeting in Washington, 9–11 November.

Colonel **Joseph A. Baird,** USAF, MC has been appointed surgeon of the Air Proving Ground Center, and hospital commander, Eglin Air Force Base, Florida. He formerly was surgeon of the Third Air Force in England.

This is Your A.M.A.

FIVE PHYSICIANS were among the more than two hundred reserve and National Guard officers of the Army, Navy, Air Force, Marine Corps, and Coast Guard and officials of government departments selected to attend a National Strategy Seminar in Washington, D.C. on 12–25 July 1959 at the National War College, Fort Lesley J. McNair. Brigadier General Harold C. Lueth, MC, USAR, and Brigadier General Richard L. Meiling, MC, USAFR, chairmen, respectively, of the Committee on Disaster Medical Care and Committee on Military Medical Affairs of the Association's Council on National Defense, were two of the five physicians selected to attend. More than 10,000 applications to attend the seminar were screened.

At this first seminar, dimensions of the scope of the communist challenge to world domination through economic, social, political, ideologic, psychologic, educational, religious, military, artistic, and other means were reviewed, analyzed, and discussed. Outstanding speakers who are recognized authorities in their fields were chosen from leading universities, foundations, business, labor, and the federal government. The approach to the situation was a well-reasoned and unemotional evaluation of facts including possible roles of action for the country's consideration. The speakers included Senator Paul H. Douglas, who gave the summary of the course; former Secretary of State Dean G. Acheson; Congressmen Walter H. Judd, A. S. J. Carnahan, Chester E. Merrow; Assistant Secretary of State J. Graham Parsons; and others. The current situation facing the United States and the free world was reviewed critically and impartially, with no mention of partisan politics.

The seminar was initiated by the Institute for American Strategy and the Reserve Officers Association, with financial support by the Richardson Foundation, and was approved by the Joint Chiefs of Staff for presentation at the National War College. Brigadier General Donald Armstrong, USA (Ret.), was commandant of the seminar and Colonel William R. Kintner, USA, was deputy commandant. The Foreign Policy Research Institute of the University of Pennsylvania was selected to prepare the curriculum and Dr. Robert Strauz-Hupe of the Institute was made the director of the course. Classes were held daily with several evening sessions. Usually there were 1-hour lectures followed by a 20 to 30 minute question and answer period, after which members of the classes went to their seminar rooms for further discussion, evaluation, and review of the material presented. Seminars were limited to 10 persons and an associate

course director served as moderator. Classes were cross sections of typical American businessmen and leaders in professional life; they included university presidents, editors, television and radio station managers, physicians, attorneys, professors, high school principals, business executives and labor leaders. A sizable library of books, pamphlets, congressional documents, and other reading material was supplied to each member of the seminar. Extensive bibliographic and collateral reading material, slides, and charts were also available upon request.

Protracted Conflict, the title of one book used in the course, might be termed the theme of the seminar. At present, there are about three billion people in the world, of whom about a billion are identified with the West and its friends, one billion or slightly less with the Sino-Soviet bloc, and the remaining billion uncommitted. From Karl Marx and his communist manifesto the unsuccessful revolutionary attempts by Lenin in 1903 that led to his imprisonment in Siberia, there has been a relentless and determined undercurrent of action for world domination. The rapid turn of events in Russia in 1917 after the overthrow of the Karenski government, and the recent developments in China after the expulsion of Chiang Kai-Shek are indicative of the determination and thoroughness with which communists pursue domination through revolution and other means.

Barter, peaceful infiltration, economic penetration, political subversion, and physical threat or violence are some of the means and methods used by communists in their quest for power. Unlike the West and its allies, who think of war and peace as separate entities, the communists consider war and peace as devices with which to gain their aims. No phase of human life is inviolable to communist propaganda, distortion, or deceit. Free nations of the world must recognize that with the emergence of communism, a many-headed source of power has entered into human activity. Traditional rules of conduct must be critically reappraised in the light of enlarged world leadership by the United States; the urgent demands of newer nation states emerging almost daily in Asia and Africa; the unmet human needs of freedom from want, fear, hunger, and disease; and the specter of a growing Sino-Soviet bloc.

The role of world leadership thrust upon the United States after World War II is a very complex, difficult, and hazardous one. The challenge is so big and so complex as to require the most thoughtful planning, skillful execution, and critical review of all actions. While the Department of State and other agencies of the government are doing much to meet the challenge, each citizen also must be prepared

for the protracted conflict generated by the communists. It is only through the intelligent and effective action of each citizen that the problem facing the nation will be met and that we shall endure as free people. Physicians have a special role to fill with their capabilities of teaching health and medical care. Both in their daily contact with patients and in their capacity as teachers, the physicians of the country must be aware of the challenge before the nation and of the means to broaden and strengthen free people throughout the world.

DEATHS

BEACH, Grace Elizabeth, Lieutenant Commander, NC, USN, of Columbia, South Carolina; assigned to U.S. Naval Hospital, Charleston, South Carolina; graduated in 1937 from Medical College of South Carolina School of Nursing, Charleston; appointed an ensign in the U.S. Naval Reserve 21 December 1943; reported for active duty 26 January 1944; released from active duty 21 April 1946; recalled to active duty 5 January 1951; commissioned a lieutenant in the United States Navy 16 July 1952; died 21 July 1959, aged 42, at Baptist Hospital, Columbia, South Carolina, of injuries received in an automobile accident.

GOLDSTEIN, Morton Mendy, Captain, DC, USAR, of Cheyenne, Wyoming; assigned to U.S. Army Garrison, Fort Lewis, Washington; graduated in 1954 from University of Kansas City School of Dentistry, Kansas City, Missouri; appointed a second lieutenant in the Army of the United States 14 September 1953; reported for active duty 14 September 1953; died 4 August 1959, aged 29, at Madigan Army Hospital, Tacoma, Washington, of malignant melanoma.

O'NEILL, Mary Rose, Lieutenant Commander, NC, USN, of Bayonne, New Jersey; assigned to U.S. Naval Hospital, Bethesda, Maryland; graduated in 1938 from Holy Name Hospital School of Nursing, Teaneck, New Jersey; appointed an ensign in the United States Naval Reserve 16 December 1943; reported for active duty 26 January 1944; commissioned a lieutenant (jg.) in the United States Navy 9 January 1947; died 24 July 1959, aged 42, at U.S. Naval Hospital, Bethesda, of cirrhosis of the liver.

SISCO, Olive Mae, Major, NC, USAR, of Sparta, New Jersey; assigned to Patterson Army Hospital, Fort Monmouth, New Jersey; graduated in 1930 from Presbyterian Hospital School of Nursing, Newark, New Jersey; appointed a second lieutenant in the Army of the United States 1 September 1943; reported for active duty 1 September 1943; died 2 August 1959, aged 52, at U.S. Naval Hospital, St. Albans, New York, of metastatic sarcoma of uterus.

TALBOT, Oliver Silas Lyle, Lieutenant Colonel, DC, USAR, of Seminary, Mississippi; assigned to 5017th Dental Detachment, Fort Leonard Wood, Missouri; graduated in 1930 from Baylor University College of Dentistry, Dallas, Texas; appointed a first lieutenant in the Army of the United States 18 June 1931; reported for active duty 12 June 1942; died 24 July 1959, aged 56, at U.S. Army Hospital, Fort Leonard Wood, of myocardial infarction.

Book Reviews

THE CLINICAL EVALUATION OF NEW DRUGS, edited by *S. O. Waife*, M.D., F.A.C.P., and *Alvin P. Shapiro*, M.D., with 14 contributors. 233 pages. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N.Y., 1959. Price $7.

This collection of essays by an impressive list of authorities writing from personal experience in a complex field may well become a medical classic. The first half of the book is concerned with general principles of drug evaluation, and passes naturally from a brief consideration of the tailoring of new drugs and their preclinical evaluation in the test tube and in animals to the philosophic, ethical, and scientific problems implicit in human trials. The second half is devoted to problems to be resolved, criteria to be met, and pitfalls to be avoided in evaluating drugs in certain specific disease areas: infectious, cardiovascular, gastrointestinal, nutritional and metabolic, endocrinologic, and neuropsychiatric. The contributors have emphasized basic principles that are less than new but that bear reiteration in this organized presentation: that extrapolating in vitro effects to clinical application is dangerous; that species differ; that it is not always possible to achieve the perfect placebo for control studies and that the placebo group usually needs its own control, the untreated group; that the double-blind technic is no guarantee of a good experiment; that such "objective" findings as the blood sodium and potassium levels, even under rigidly "controlled" conditions of diet and environment on a metabolic ward are subject to significant deviations resulting from individual "stresses." There are also many concepts that will be new to some: the sequentially designed experiment that allows "controlled peeking"; the difference between "random" and haphazard assignment of patients for valid comparisons; the usefulness of calculating confidence limits; the limitations of "each patient his own control"; the dubious advantages of matching patients for clinical trials; the complete vitiation of results that sometimes occurs when patients are lost from observation. Of more than passing interest are the review of the personality characteristics of the placebo reactor; the discussion of the ethics of human experimentation; and the final chapter on the components of the "proper paper," the meritorious publication of the positive and negative results of one's scientific labors, thoughtfully interpreted. Evidence is presented that certain classes of drugs, especially those which modify subjective responses, act primarily on the psychic reaction component of suffering rather than on the original sensation of pain; and that this explains the mechanism by which placebos relieve pain.

Highlighting this uniformly authoritative discussion are a number of pearls: that it is better to scrap an entire experiment than to collect useless data; that a sound experiment can be designed and executed without specialized advice; that an accumulation of negative findings appearing statistically valid may completely mask a lone positive truth; and that fewer scientists are motivated by curiosity than by an urge for money, approbation, and prestige. It will gratify the writer who has developed cramp and the researcher caught in a dead-end to learn that "there is a mysterious periodicity in creative work." Described on the jacket as "for the clinician and investigator who ever uses a new drug,"

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this collection does indeed have something for every physician interested in therapy. It is a book that many will read from cover to cover almost without interruption; in which others will prefer to browse during leisure moments; and that most will want to hold for permanent use on the reference shelf.

MAY SHERMAN, M.D.

TEXTBOOK OF PHYSIOLOGY AND BIOCHEMISTRY, by *George H. Bell*, B. Sc., M.D., F.R.F.R.S.G., F.R.S.E., *J. Norman Davidson*, M.D., D. Sc., F.R.F.P.S.G., F.R.I.C., F.R.S.E., and *Harold Scarborough*, M.B., Ph.D., F.R.C.P.E., M.R.C.P. 4th edition. 1,065 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $12.50.

This book, because of its easy readability and clarity of presentation, will be welcomed by the student burdened by more compendious texts. Over-all understanding of a process, a system, or a compound seems more readily available than is usually the case. However, it appeared to the reviewer that the book suffers severely on other counts. It lacks the depth desirable to nurture a more active scientific attitude on the part of the student. It fails to keep up-to-date with the advance of information to the extent that a textbook should. Too frequently it deletes treatment of material of importance, whereas on the other hand it retains discussions of concepts and theories no longer acceptable to investigators in the areas involved. Examples of these failures are numerous and generally characterize the text. In short, this book is not to be recommended to the more serious or advanced student of physiology or biochemistry but may be found useful as an introductory text in these areas.

CAPT. RONALD E. MYERS, MC, USA

FUNCTION OF THE HUMAN BODY, by *Arthur C. Guyton*, M.D. 584 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $7.50.

The author has written a survey of the field of physiology at the undergraduate level for those students who do not have an extensive background in biology, physics, and chemistry. He has borrowed many simplified diagrams from his earlier, more extensive *Textbook of Medical Physiology*, written apparently for medical students. His format, however, is quite different in his present elementary book. The chapters in the latter follow each other systematically and there is no sense of sharp demarcation from one section to another. The text is written in a relatively simple style, reads easily, and covers the physiologic ground adequately considering the level at which it is directed. There are two points of criticism that can be mentioned, however: first, that some of the physical and chemical concepts are oversimplified, as in the discussion of osmosis, diffusion, and acid-base balance; second, that several illustrations from the author's advanced textbook have been reproduced in the text under review. In several cases there is no explanatory text material for some of the labels on the reproduced diagrams. The chapter on aviation and deep-sea diving physiology is of particular interest. It will serve to illustrate to the student how critical is the external environment insofar as homeostasis in mammalian physiology is concerned. The reviewer considers that the author has achieved his goal in presenting a comprehensive, orderly, and easily read textbook of physiology directed to undergraduate and nonprofessional students. It is also of potential use as a ready reference in the library of the professional physiologist or medical practitioner.

CAPT. CHARLES F. GELL, MC, USN

THE EFFECT OF PHARMACOLOGIC AGENTS ON THE NERVOUS SYSTEM. Proceedings of the Association, December 13 and 14, 1957, New York, N.Y. Research Publications Association for Research in Nervous and Mental Disease, Vol. XXXVII, edited by *Francis J. Braceland*, M.D. 488 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $13.50.

In this report of the proceedings of the 1957 meeting of the association, there are 26 chapters by some 40 authors. The scope is in some ways broader and in some ways narrower than the title would imply. Although it does not deal with toxic agents and anesthetics, the book does discuss the use of chemotherapeutic agents and biologicals, substances which in effective doses may have no effect on nervous tissue; and it even includes chapters on metabolic defects, on chemical concepts of mental function, and on abnormal substances in the serum associated with psychotic behavior. Among the more interesting and informative chapters are those on the evaluation of drugs in animals and patients, including an important one on the role of the placebo. The information on the use of drugs in psychiatric disorders, while valuable, has been extended and partly superseded by newer information in this rapidly expanding field. The chapters on chemical concepts of mental states and on abnormal substances in serum review several provocative hypotheses concerning the induction and the biochemical concomitants of psychiatric disorders. The book will be valuable to those engaged in the practice of neurology and psychiatry as well as to those actively engaged in research.

COL. PAUL K. SMITH, USAFR

A SHORT PRACTICE OF SURGERY, by *Hamilton Bailey*, F.R.C.S., F.A.C.S., F.I.C.S., F.R.S.E., and *McNeill Love*, M.S., F.R.C.S., F.A.C.S., F.I.C.S., with chapters by *John Charnley*, F.R.C.S., *William P. Cleland*, M.R.C.P., and *Geoffrey Knight*, F.R.C.S., 11th edition. 1,389 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa. 1959. Price $18.

This eleventh edition has been commendably rewritten to keep pace with the present trends in surgery. However, to call this a "short" practice of surgery is to give it a misnomer, for it has grown into a tome of almost 1,400 pages and 1,697 illustrations, and weighs 7 pounds, 2 ounces, complete with a ribbon bookmark. The well-chosen and excellent illustrations and the semi-outline form of presentation make for easy reading and reference. One disadvantage is the lack of a bibliography for those desiring more detailed information on a subject. The footnotes on each page are replete with interesting medical history and contribute to making this an outstanding book. Although the American reader will find room for argument on some recommended methods of treatment, sound surgical principles are advocated throughout. In my opinion, this is the best textbook of general surgery on the market today, warranting wider use in this country.

CAPT. L. L. HAYNES, MC, USN

RADIATION BIOLOGY AND CANCER, A collection of papers presented at the Twelfth Annual Symposium on Fundamental Cancer Research, 1958, edited by the staff at the University of Texas M. D. Anderson Hospital and Tumor Institute. 493 pages; illustrated. University of Texas Press, Austin, Tex., 1959. Price $8.50.

This is a worthwhile collection of manuscripts dealing with the basic aspects of radiation biology and cancer. The monograph is divided into seven sections thoroughly covering the field, is well illustrated by diagrams, tables, and excel-

lent microphotographs, and contains an extensive bibliography for each paper. It is indexed by author, title, and a table of contents. The authors listed are among the leaders in the fields of radiobiology, radiology, and cancer research, and the volume is of interest to all workers in these fields because it so ably correlates the current research now in progress in these closely allied sciences. Timely subjects such as the effect of ionizing radiation on man and animals, the relation of neoplasia to ionizing radiation, carcinogenesis, virus etiology of cancer, relation of radiation and genetics, and medical applications of supervoltage radiation are discussed in an interesting and concise presentation of a vast amount of material. The basic research regarding cancer induction, so well tabulated, is a real contribution to the background through which future advancement in this field may be expected. This volume is highly recommended as a part of the reference library for those interested in the cancer problem and radiobiology.

CAPT. SYLVESTER F. WILLIAMS, MC, USN

TRIGEMINAL NEURALGIA, Its History and Treatment, by *Byron Stookey*, A.M., M.D., and *Joseph Ranshoff*, M.D. 366 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $10.75.

This very excellent book presents the history, anatomic background, and treatment of various pain problems in and about the face and head. It is written in a clear and lively style. Especially enjoyable are some of the early descriptions of tic douloureux and some of the initial efforts taken to alleviate this condition. The various operative procedures for tic douloureux have been described in detail and evaluated. The advantages and disadvantages of the various technics are discussed, not only from the viewpoint of the authors' several hundred treated cases but also by means of the comments and opinions of other outstanding neurosurgeons. The illustrations are clear and adequate and contribute much to the printed material. This book can be highly recommended to those interested in medicine, dentistry, and medical history.

LT. COL. JOHN B. MOYAR, MC, USA

FUNDAMENTALS IN NURSING CARE, by *Mildred L. Montag*, Ed. D., R.N., and *Ruth P. Stewart Swenson*, M.A., R.N. 3d edition. 581 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $5.

This is one of the "modern nursing texts" in which the authors have considered many aspects of patient care. Specific nursing procedures have been omitted in favor of general principles and methods. These are integrated throughout the text to emphasize all the important considerations of patient care. The first section is in the sphere of professional adjustments and gives a current analysis and survey of the opportunities and challenges offered in the career of nursing today. The later sections are devoted, first, to experiences in direct patient contact and patient care and then to the more complex considerations of diagnosis and therapy. The book encompasses young adulthood to old age and goes from the detailed care of the patient to the over-all consideration of hospital environment. The interesting and comprehensive presentation should make this book stimulating to the student nurse. For the young nurse instructor, it will provide good background and principles for procedure development, by means of both the discussion and the pertinent illustrations. For the teacher who would like to evaluate procedures taught repeatedly in the past, this book offers a fresh view.

MAJ. DELZENA E. GARRARD, NC, USA

A TEXTBOOK OF PHARMACOLOGY AND THERAPEUTICS, Including Drugs and Solutions, by *Harold N. Wright*, M.S., Ph. D., and *Mildred Montag*, Ed.D., R.N., with an appendix on Canadian Drug Legislation by *Charles W. Nash*, B. Sc., Ph.D. 7th edition. 497 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $5.

This book should be well received by both the nurse and the physician. The administration of drugs to patients is one of the most important functions performed by the nurse in the course of her duties in medical, surgical, psychiatric, or pediatric nursing. It is the physician who makes the diagnosis and prescribes the treatment but upon the nurse usually rests the responsibility for the administration of the medication and the observation and recording of its effects. Like its predecessors, this seventh edition attempts to bring pharmacology and therapeutics abreast of the recent advances. The preparations listed are in conformity with the fifteenth edition of the *United States Pharmacopeia*, the tenth edition of the *National Formulary*, and the 1958 edition of *New and Nonofficial Drugs*. The chapter on acid-base, fluid, and electrolyte balance has been greatly expanded, with the addition of a more extensive discussion of clinical acidosis and alkalosis and the parenteral use of the various solutions of electrolytes. Complete new sections on the use of tranquilizers and anti-parkinsonian drugs have been added to the chapter on hypnotics and related drugs. In the chapter on cardiovascular drugs, the material dealing with the antihypertensive drugs has been almost completely rewritten. Because of its close relationship to the treatment of cardiovascular disease and hypertension, the chapter on diuretic drugs has been brought into the section dealing with the treatment of cardiovascular diseases. Discussion of the use of the newer diuretic agents has been considerably expanded. New material has been added to the arithmetic review and all introductory arithmetic has been brought together in a single chapter. New material has been added also dealing with normal and molar solutions, equivalents and milliequivalents. This section is emphasized by the use of a special format. This excellent book is recommended to nurses and physicians who desire a concise presentation of the field of pharmacology and therapeutics that is applicable to military medicine.

LT. COL. MAXWELL DAUER, MSC, USA

THE INNERVATION OF MUSCLE, A Biopsy Study, by *C. Coers*, M.D., and *A. L. Woolf*, M.D. 149 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $9.

One of the last achievements of the late Dr. J. G. Greenfield was the publication of an "Atlas of Muscle Pathology," jointly with Drs. Shy, Alvord, and Berg. In the field of neuromuscular diseases, this atlas covered the muscular aspect in a thorough manner. However, there was a gap left in our knowledge of neural and muscular changes at the site of the end plate as the actual myoneural junction. This gap has now been closed by a work of highest quality. Drs. Coers and Woolf present a complete survey of the normal and pathologic histology of intramuscular nerves and nerve endings. The material has been gathered by numerous biopsies. Vital staining by local injection of methylene blue, cholinesterase histochemistry, and Bielschowsky silver impregnation have been used and are described in detailed prescriptions. The quality of the illustrations is excellent. The text is neither overly short nor effusive. In the

chapter on special pathology, all "angles" are being considered. This book merits compliments and unreserved recommendation.

WEBB HAYMAKER, M. D.

PANCREATITIS, A Clinical-Pathologic Correlation, by *Herman T. Blumenthal*, Ph. D., M.D., and *J. G. Probstein*, M.D., with a foreword by *R. M. Zollinger*, M.D. 379 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $9.50.

For many decades there have been no striking advances in our comprehension of the etiology and pathogenesis of pancreatitis. The common channel theory of Opie was formulated at the turn of the century. The major contribution of Rich and Duff appeared in print more than 20 years ago. The authors have presented their topic in an encyclopedic fashion based on a personal experience in the field of a quarter of a century. The monograph is arranged in five parts, each with its own summary and extensive bibliography. Part I deals with statistical considerations and etiology, part II with pathologic physiology, part III with pathologic anatomy, part IV with clinical manifestations and part V with therapy. Each section is written in a careful, comprehensive, and conservative manner. A final chapter highlights the conclusions of the authors. Those readers who hope to find in the monograph an answer to the riddle of pancreatitis will be disappointed, yet the book serves a purpose. It focuses attention on the complexities of the disease and on problems for future study.

LT. COL. HELMUTH SPRINZ, MC, USA

SURGERY OF THE EAR, by *George E. Shambaugh, Jr.*, M.D. 669 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $27.50.

An outstanding book on surgery of the ear is very welcome. Doctor Shambaugh has compiled a masterpiece on this subject. Beautifully bound, on heavy paper, with large, clear print, and extensively illustrated, it is easy to read and easy to understand, and very thoroughly covers its subject. There have been extensive advances in ear surgery in the last 20 years. It is convenient to have this knowledge gathered into one volume. The book begins with the developmental and surgical anatomy of the ear, the diagnosis of ear disease, the radiologic examination of the ear, and the principles of ear surgery. The second part covers surgery of infections of the ear, pathology, the external ear, the simple and radical mastoid operations, and complications of otitis media, both meningeal and nonmeningeal. Part III covers surgery for deafness, the correction of congenital malformations, tympanoplasty, stapes mobilization, and fenestration for otosclerosis. The latest technics have been included. Finally, part IV covers surgery of the facial nerve, endolymphatic hydrops, and tumors of the ear. Not only is the technical management adequately described, but each part is headed by a short history of the development of that field. The excellent, orderly presentation, with the necessary detail, makes this book easy to read, and extremely informative. Everyone interested in the ear and its surgery will be delighted to study this beautiful book.

COL. HENRY S. MURPHEY, MC, USA

HANDBOOK OF DIET THERAPY, by *Dorothea Turner*. 3d edition. 222 pages. University of Chicago Press, Chicago. Ill., 1959. Price $5.

There is no question but that the editor of this book has achieved her objective in providing a convenient reference and guide for dietetic practice. It is prac-

tical, clearly written and thought provoking. Material presented in previous editions has been expanded, references have been brought up to date, and useful information on the fatty acid content of foods has been added. The section on normal nutrition has been broadened to include adolescence and old age. Emphasis throughout this book is on optional nutrition. Therapeutic diets are described in terms of dietetic principles rather than in terms of diseases or names of physicians. This approach allows for greater flexibility in treatment by diet and encourages consideration of the patient as an individual. The description of the daily food plan by food group rather than individual food items as well as the inclusion of a sample menu pattern and sample meals is an invaluable teaching aid. This book is recommended for both the physician and the dietitian.

LT. COL. HELEN M. DAVIS, AMSC

CONDUCTION, INFILTRATION AND GENERAL ANESTHESIA IN DENTISTRY, by the late *Mendel Nevin*, D.D.S., and *Marshall I. Nevin*, M.D., F.C.C.P. General anesthesia section by *Julious Roy Bourgoyne*, B.S., D.D.S. 6th edition. 392 pages; illustrated with engravings and large trigeminal chart. Dental Items of Interest Publishing Co., Inc., Brooklyn, N.Y., 1959. Price $8.50.

This is the twentieth printing and the first posthumous edition of a book familiar to the dental profession, revised once more and with a new section on general anesthesia in dentistry. Part I of this text deals with the indications, scope, and technic of administration of local anesthesia as required in the practice of dentistry. The many illustrations successfully depict the anatomy of the sensory innervation of the face and oral structures. The technic of placement of anesthetic solutions and the structures anesthetized are accurately explained and illustrated in detail. Three chapters at the end of this section deal with preoperative and postoperative medications, untoward reactions, and indicated treatment. In the last chapter the author has raised and answered a number of questions pertaining to frequently encountered complications of local anesthetic injections. Part II deals with the indications, contraindications, types of anesthetic agents, technic of administration, and complications that may arise during the utilization of general anesthesia in dental office practice. The presentation is conducted along practical lines. The use of general anesthetics, both inhalants and intravenous agents, is described and the stages of anesthesia correlated with the observable salient signs. This volume contains little on the physiology or pharmacology of anesthetic agents. However, the copious illustrations and descriptive detail qualify it as a fine reference and teaching text for the dental student.

COL. LOWELL E. MC KELVEY, DC, USA

BIOLOGICAL PSYCHIATRY, edited by *Jules H. Masserman*, M.D. 338 pages. Grune & Stratton, New York, N.Y., 1959. Price $9.75.

For those who are interested, this collection of papers by 77 contributors, covering the Proceedings of the Scientific Sessions of the Society of Biological Psychiatry, is a most worthwhile current reference volume. The book is divided into five parts: I. Neuroanatomy and Neurophysiology. This section, highly technical in parts, has its practical considerations too as it considers such topics as chemical studies correlated with neurologic behavior, behavioral changes associated with stimulation of the reticular formation, drugs used in the treatment of depressions, and sexual deviation. II. Clinical Research. This part comprises clinical metabolic research in manic depressive illness, the catechol amines in relation to induced electrical convulsions, and the action of epinephrine breakdown

products on cerebral functions. III & IV. Psychopharmacologic Research and Drugs in Psychiatric Therapy. These sections include an objective approach to psychiatric diagnosis by means of the conditioned reflex technic; a theory for the action of convulsive therapy; studies with lysergic acid diethylamide in regressed schizophrenics; observations on reactions to phrenotropic drugs; a provocative discussion of changes in the psychodynamic structure of schizophrenic patients with reserpine administration; reports on the effects of ceruloplasmin in schizophrenics, iproniazid treatment in depressions, and trifluopromazine treatment in psychotics; and a comparison of the more commonly used phenothiazine tranquilizers as regards major side effects, extrapyramidal reactions, effective initial daily dosage range, and therapeutic results. V. Cerebral Pharmacology and Psychopharmacology. In summary, this volume includes much that is of current interest in biologic psychiatry and is not to be covered in haste. One can only be impressed with the complexity of the subject and how much remains as a field for research. Whatever one's particular psychiatric leaning, it is interesting to consider, amidst these many scientific papers, Dr. Masserman's opinion "that the best therapist is he who helps troubled men rebuild, largely on their own terms, their faith in themselves, in their fellowmen, and in their privately selected gods" (p. 110).

LT. COMDR. CHARLES E. HERLIHY, MC, USN

PREVENTIVE MEDICINE, Principles of Prevention in the Occurrence and Progression of Disease, edited by *Herman E. Hilleboe*, M.D., and *Granville W. Larimore*, M.D. 731 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $12.

The many disciplines and multitudinous problems of preventive medicine are well covered by the editors, who are eminent practitioners and teachers of public health, and 29 other contributors who have had extensive experience in the promotion of health. Throughout the volume strong effort is made to encourage all engaged in the practice of medicine to apply the principles of preventive medicine in their everyday practice. The benefits to be derived by "the intelligent fusion of private and public preventive medicine" is stressed in many of the 41 chapters. The contents are presented in three parts: Prevention of Occurrence; Prevention of Progression; and Supporting Services for Preventive Medicine. The chapters of the first part deal with the many problems of environment requiring control; prophylactic measures to be taken against the infectious and parasitic diseases; proper and adequate nutrition; elimination of pre-disease conditions, such as obesity, in the maternal cycle and newborn period, and preventive services in childhood; and preventive dentistry including the nutritional aspects of dental health. In the second part one finds the latest thinking in the prevention of progression of disease involving periodic health inventories, detection and screening methods, follow-up of screening and diagnostic examinations, rehabilitation, alcoholism and narcotic addiction. The final part emphasizes the role of supporting services in the practice of preventive medicine and their availability to the public health and family physician. The role of education and of the hospital, the services of social workers, public health nurses, official and voluntary health agencies, and epidemiologic methods are discussed. The book is well indexed. The subjects covered are so extensive that it would be impossible to treat them in minute detail. To offset this there will be found at the end of each chapter a list of pertinent and up-to-date references. Family, school, and public health physicians will find this treatise of preventive medicine most useful in their practice. It will not only provide the

medical student with a point of view, but with valuable information relative to the prevention and progression of disease.

CAPT. HOWARD K. SESSIONS, MC, USN

MOLOY'S EVALUATION OF THE PELVIS IN OBSTETRICS, by *Charles M. Steer*, M.D., Med. Sc. D., F.A.C.S., F.A.C.O.G. 2d edition. 131 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $4.

It is nice to have this small hard-bound standard reference in our dystocia clinic. This new edition by Dr. Steer is improved by some new figures in the early chapters, by an analysis of the frequency of occurrence of the various pelvic types from a series of over 1,000 roentgenographic examinations and over 19,000 clinical evaluations, and by a tabulation of the percent of probability of serious arrest in the various pelvic types. The section on forceps operations, which was sketchy in the first editions, has been deleted and a section on the relationship of head positions to pelvic type at the inlet has been added. There is also a new chapter on the recognition of disproportion. As described here, this recognition is a continuing process during the course of pregnancy and consists of: (1) clinical examination early in pregnancy; (2) observation late in pregnancy for the size of the fetus and expected engagement near term; (3) reexamination clinically at the onset of labor; and (4) estimation of disproportion by x-ray pelvimetry. This we believe puts proper emphasis on clinical evaluation and de-emphasizes roentgenographic examinations of the pregnant female, the incidence of which in the author's private patients has decreased from 30 percent to about 10 percent and is still about double the number performed in many clinics. This fine little reference book is a necessity in any dystocia clinic or obstetric x-ray conference room.

CAPT. DWIGHT A. CALLAGAN, MC, USN

X-RAY DIAGNOSIS OF THE ALIMENTARY TRACT IN INFANTS AND CHILDREN, by *Edward B. Singleton*, M.D. 352 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1958. Price $11.

This is a valuable reference text for any physician doing children's fluoroscopy and radiology. The information presented is current and more detailed than most pediatric radiographic textbooks. The volume will serve as a ready reference for the occasional examiner of the alimentary tract in infants and children, as it thoroughly reviews the anatomy, physiology, and pathology of the parts to be examined. Good illustrations of each pathologic condition as well as the normal infant gastrointestinal tract are presented. All of the common and many rarer entities are discussed. A particularly good review of controversial subjects such as esophageal-gastric junction and congenital anomalies are handled in detail. These discussions are supported by a good bibliography. Types and methods of examination are discussed at the beginning of the chapters. These dissertations on the performance of the examinations are especially valuable to the radiologist who infrequently examines children. This book makes a valuable addition to the library of the radiologist and also would be useful to pediatricians as a reference book on the gastrointestinal tract of children.

JAMES M. KEEGAN, M.D.

PEDIATRIC NEUROLOGY, by *Stanley S. Lamm*, M.D. 495 pages; illustrated. Landsberger Medical Books, Inc., New York, N.Y., 1959. Price $12.90.

The present volume will probably fill the need for a textbook of pediatric neurology for daily use at the clinical level rather than as a reference work.

Disease entities are presented under the following major headings: clinical picture, laboratory, pathology, diagnosis, prognosis, and treatment. This makes for easy reading and facilitates the use of the book. The few illustrations are well chosen and pertinent to the text. The author has stressed the clinical picture and included discussions of anatomy, physiology, and specific description of laboratory procedures only if pertinent to the disease in question. The volume is welcome because the philosophy of the author is that of a pediatrician with special interest in neurology rather than that of a neurologist with interest in pediatrics. This is important to the pediatrician where such long-term problems as cerebral palsy are presented. Treatment of the whole child is stressed and not merely the neurologic implications. The references offered are adequate and include many classical papers as well as pertinent selections from the recent literature.

MAJ. FREDERICK C. BIEHUSEN, MC, USA

HYPNOSIS IN MODERN MEDICINE, edited by *Jerome M. Schneck*, A.B., M.D. 2d edition. 389 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $8.75.

This is the second edition of a work considered by many as the first textbook dealing with hypnosis and the medical specialties. Eleven contributors from varied medical disciplines have produced an exhaustive analysis of the present role of hypnosis in medicine and, with the exception of occasional naive statements, the material is consistent with accepted psychiatric principles. Subject matter not intensively considered is referred to a well-selected bibliography. Dr. Jerome Schneck, the editor and president of the American Board of Medical Hypnosis, has selected an outstanding group of contributors and has himself written an illuminating chapter on hypnosis in psychiatry. An important concept running through the book indicates that although the suggesting away of symptoms with hypnosis does not resolve the basic psychodynamic conflict, it does serve to break the vicious cycles which symptoms tend to perpetrate and thereby enables the patient to face his problems on a healthier level of adjustment. This is amply corroborated with case examples. Also emphasized is the fact that even though hypnosis has been quite valuable in the hands of the various specialists, all agree that with more investigation and research unhampered by the adverse emotional responses so commonly seen, the full potential and value of hypnosis can be realized. A fascinating chapter on the history of medical hypnosis prepares a basic background for the book. Valuable chapters on technic, physiology, and theory are included. The literature reviewed for this edition is up to date and stimulating. The volume can be read with profit by all medical practitioners.

MAJ. ROBERT F. HOOD, USAF, MC

DANGEROUS MARINE ANIMALS, by *Bruce W. Halstead*, M.D. 146 pages; illustrated. Cornell Maritime Press, Cambridge, Md., 1959. Price $4.

This handbook presents information about marine animals that bite, marine animals that sting, and marine animals that are poisonous to eat. A historical first chapter summarizes the myths and fables which attest to the age-old respect of the fisherman, interest of the novelist, fear of the diver and curiosity of the naturalist inspired by the fauna of the reefs and seas. Another second chapter deals with sharks, barracuda, sea lions, and killer whales. Also included here are giant mantas, giant groupers and tridacna clams, not because they are aggressive biters, but because by their size and habits, they may seriously interfere with or trap the diver.

The chapter dealing with stinging jellyfish, sea nettles, poisonous corals, sea urchins, armed gastropods, sting rays, catfish, scorpion fish, stargazers, sea snakes, and other commonly encountered beautiful, curious, repellent, or frightening creatures that live in the reefs, off the beaches, and in river mouths, will gain the undivided attention of fisherman, bather, and shell collector. Perhaps the most important to most people is a treatise on fish poisoning dealing not only with the description and distribution of poisonous fish but also describing briefly the mechanisms that may produce toxins in fish that are at most times and at most places edible and even of great economic importance. In addition, there are warnings concerning poisoning that may result from ingestion of various tissues of sea turtles, polar bears, seals, and sea lions.

Because many of the bites, stings, and ingested toxins are disabling and even lethal, especially when not treated promptly, first-aid measures are given in detail. The scope of medical information is not limited to that area, however, and the physician will find instruction that will supplement his textbooks of medicine and therapeutics. A selected bibliography of 23 sources is included. This is a book primarily for skin divers, but it will also be purchased by explorers, fishermen, maritime and port physicians, and by many of the host of vacationers who annually wade and bathe in the ocean and poke about strange reefs for shellfish and coral. It should be on the shelves of high school, college, public, medical, and marine libraries. CAPT. SIDNEY A. BRITTEN, MC, USN

PERIPHERAL VASCULAR DISEASES, An Objective Approach, by *Travis Winsor*, M.D., F.A.C.P., with a foreword by *Burrell O. Raulston*, M.D. 845 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $16.50.

The initial and most striking characteristic of this book is the size and number of the illustrations. There are 435 figures of schematic drawings, charts and graphs, many of which are of full-page size. The author has been one of the pioneers in studying the dynamics of the circulation with some of the newer methods, using electronic equipment, especially that of segmental and digital plethysmography. With the use of these instruments, he has succeeded in presenting an objective approach to the understanding and treatment of patients with peripheral vascular disease. Divided into two almost equal parts, the first half starts with a discussion of the functional anatomy of the human circulation and nervous system and the way in which various organs of the body affect blood flow. Clinical applications are made more objectively by the use of these new technics in determining the degree of involvement or response to drugs or stimuli in peripheral vascular diseases. Besides plethysmography, the author includes such other diagnostic technics as arteriography, venography, use of radioisotopes, skin temperature, infrared photography, oscillometry, and capillary microscopy in his discussion. The second half of the book deals with the classification, etiology, diagnosis, and treatment of peripheral vascular disease entities. Each subject is presented in a brief, concise discussion, some with illustrations, which makes an excellent reference for anyone seeking a quick, simplified review of a condition. For more detailed information a short but adequate bibliography is given at the end of each chapter. Various forms of treatment, including present-day surgical measures, are presented in the final chapter. This book is considered a good reference for the student or physician who desires a quick and simplified review of both the fundamentals and entities dealing with peripheral vascular diseases.

COL. DOSS O. LYNN, MC, USA

INTRA VASCULAR CATHETERIZATION, compiled and edited by *Henry A. Zimmerman*, M.D., B.S., with 21 contributors. 782 pages; illustrated. Charles C Thomas, publisher, Springfield, Ill., 1959. Price. $16.75

The 17 chapters in this valuable book are written by various outstanding specialists in cardiovascular disease. The detailed discussion includes the technic of cardiac catheterization, including selection and preparation of patients; left heart catheterization with coverage of methods, indications, and interpretation of results; pressure curve analysis with separate discussion of each type of cardiac condition which may be evaluated through such analysis; the hydraulics and mathematics of shunt flows and valve areas; the value and results of cardiac catheterization in noncyanotic and cyanotic congenital heart disease respectively; the physiology of the pulmonary circulation and specific related cardiac diseases; catheterization of the coronary sinus including evaluation of results and possible dangers encountered; hepatic metabolism by liver catheterization through the inferior vena cava and hepatic veins; and the contributions of intracardiac catheterization to evaluation of renal physiology and disease and to intracardiac electrocardiography respectively. Technics and results are discussed in detail. Numerous tables, graphs, and electrocardiograms illustrate these chapters. This book is an outstanding contribution to the fields of cardiology and cardiovascular surgery. It is very readable and concise. The extensive bibliographies which follow each chapter are valuable to anyone interested in these fields. Although an advanced study in specialty practice, this volume provides a very useful reference for any who seek data concerning intravascular catheterization. COL. BRYON A. NICHOLS, MC, USA

INSTRUMENTATION IN ANESTHESIOLOGY, by *William H. L. Dornette, M.D.*, and *Verne L. Brechner*, M.D. 237 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1959. Price $8.

This small book contains 21 chapters, 9 of which are devoted to devices which measure various physiologic responses of the body. The first five chapters cover basic physics and electronics and their study enables the reader to better understand the monitoring apparatus whose descriptions and uses follow. The remaining chapters are devoted to movements and analysis of gases and fluids. The authors provide information concerning the basic instruments which detect and record electrical, chemical, thermal, and physical changes occurring in the body organs, fluids, and gases for the anesthesiologist or physician desiring to review basic physics and electricity. The book stresses the construction more than the use of these metering devices. Little or no effort is made to interpret resultant records. The complex of conductors, circuits, tubes, amplifiers, and controls necessary to support such instruments as the ECG and EEG is not generally known to physicians. A chapter, devoted to flowmeters and their construction, is followed by 65 pages of analysis of fluids and gases which is in greater detail than seems warranted in such a book. The text is easy to read and comprehend despite minor typographic errors.

COL. ROBERT F. CORWIN, USAF, MC

PATHOLOGY, by *Peter A. Herbut*, M.D. 2d edition. 1,516 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1959. Price $18.50.

With the current rapid expansion of knowledge in the field of medicine, any author of a general textbook, particularly such a broad subject as pathology, has an onerous task. The medical student facing his early formative years in

medicine should be taught and learn to discipline his thinking regarding the innumerable abnormalities he will encounter. As an aid in accomplishing this self-discipline, Dr. Herbut has followed his original format in this second edition, namely, that each disease is presented in a logical sequence including definition, incidence, cause, gross appearance, microscopic appearance, complications, clinical pathologic correlation, diagnosis, treatment and prognosis. With this second edition he also has added 288 additional pages with 213 photographs. The significant addition to each chapter in systemic pathology has been the inclusion of a brief summary of the normal physiology, a discussion of the deviations from the normal, an explanation on morphological grounds of the reasons for the altered physiology, and a brief discussion of the various laboratory tests by which the altered physiologic function can be detected. From these aspects the text is convenient for both students and practitioners alike; nevertheless, the book is beset by some of the inherent difficulties with the writing of any book. These are the errors of commission and the errors of omission. The book is in general agreement with current accepted thinking but, in a few instances, the factual information deviates somewhat; such an example is Dr. Herbut's explanation of chronic granulomatous inflammation. With respect to errors of omission it is of particular interest to the military that fundamental problems such as newer chemical poisons, fat, and air embolism are not treated in an up-to-date manner. This is a good reference source; however, this edition of 1,516 pages has about reached the limits of desirability for student use.

MAJ. VERNIE A. STEMBRIDGE, USAFR

FUNDAMENTALS OF OTOLARYNGOLOGY, A Textbook of Ear, Nose and Throat Diseases, by *Lawrence R. Boies*, M.D. 3d edition. 510 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $8.

This text offers fundamental information to the medical student and the physician who is not a specialist in otolaryngology. The importance of teaching the fundamentals of this specialty to the undergraduate is emphasized by recent surveys which have shown that about 25 per cent of the activities of the general practitioner are concerned with diseases of the ear, nose and throat. These surveys also emphasize the desirability for continued study, by the general physician, in the fundamentals of this expanding specialty. The third edition of this book is well written and well illustrated. Over half of the 36 chapters have been revised or rewritten. Obsolete portions have been deleted and recent developments have been added. While some mistakes are inevitable in any publication, I only noted two in my review of this book: On page 390, figure 172 is upside down. This might be confusing to some readers. On page 29, in the 10th line from the bottom of the page, "100 cycles" should read "1,000 cycles." Some of the changes which I consider to be of outstanding importance will be mentioned briefly: (1) In chapter 1, the addition of quotations from the outstanding investigator, Dr. Georg von Békésy of the Psycho-Acoustic Laboratory of Harvard, gives the student an understandable explanation of the physiology of hearing. (2) In chapter 2, the author mentions the whispered and spoken voice tests for hearing, as tests that were once used. These obsolete tests are not described in the third edition. Pure tone and speech audiometry, however, are well covered. (3) In chapter 3, the section on perceptive deafness gives a more comprehensive discussion of such causes as noise and blast exposure, blows to the head and ears, toxins, vascular lesions, tumors and multiple sclerosis. The section on treatment of hearing loss includes the recently de-

veloped surgical procedures; tympanoplasty, myringoplasty, and stapes mobilization. (4) In chapter 5, an excellent discussion of the causes of earache has been added. (5) In chapter 6, an excellent discussion on the facial nerve has been added. The author emphasized that all cases of facial palsy call for an otologist's opinion. (6) Chapter 21, "Injuries of the Nose," in the second edition, has been expanded to include all maxillofacial injuries and the new title is "Maxillofacial Injury." (7) Chapter 22, "Reconstructive Nasal Surgery," is entirely new. It introduces to the student some of the newer concepts in physiology of the external nasal pyramid. (8) Chapter 34, "Tumefactions of the Neck," and chapter 35, "Diseases of the Salivary Glands," are timely additions and give recognition to the fact that the study of otolaryngology includes these subjects. Chapter 27 has no significant change, but to those otolaryngologists who avoid tonsillectomy under endotracheal anesthesia, because the anesthetist's equipment interferes with his operative field, I recommend a careful study of this chapter. This text is highly recommended for the undergraduate medical student, as a handbook for the first-year resident in otolaryngology, and a guide for the general physician. COL. BYRON G. MC KIBBEN, MC, USA

GYNECOLOGIC ENDOCRINOLOGY, by *Gardner M. Riley*, Ph. D., with a foreword by *Norman F. Miller*, M.D. 330 pages; illustrated. Paul B. Hoeber, Inc., New York, N.Y., 1959. Price $8.75.

This is a concise, current evaluation of endocrinology as it relates to the female patient. The text is divided into three main sections. The first presents the basic physiology of the pituitary gland and the ovary, and their relation to the menstrual cycle, pregnancy and the breast. This is followed by a clinical section. Here diagnostic approach and thoroughly evaluated therapeutic regimens are applied to endocrine problems of menstruation, puberty, abnormal sexual development, infertility, pregnancy, and the menopause.. The last section presents laboratory procedures, the pharmacology of the female hormones and present commercial products available for therapy. The book is well written, easily read, and understandable. The suggestion that it is "for every doctor who sees the woman patient" is quite apt; however, it would be of most value to the medical student, intern, and generalist.

LT. COL. WILLIAM C. HERNQUIST, USAF, MC

WHY DOCTORS WRITE

Medical advancement is somewhat like the dawn around the world, always occurring, every minute of the day, with slow but steady progress. There are occasional cataclysmic discoveries from training in observation, or by serendipity, and always there is our need and desire to "observe and record for mankind." Perhaps this literary heritage, this widespread interest in medicine, observed in the literature of the ages, can show us the true value of faith and spirit in our work, and thus be an inspiring challenge to our profession.—JAMES BARRETT BROWN: Examples of the Inspiring Challenge to Medicine in Literature Through the Ages. *A.M.A. Archives of Surgery*, May 1959.

New Books

Books received by the U.S. ARMED FORCES MEDICAL JOURNAL *are listed in this department for the information of readers, and as acknowledgement and appreciation of their receipt from the publishers. Those of greatest interest will be selected for review in a subsequent number of the* JOURNAL.

THE ANASTOMOSES BETWEEN THE LEPTOMENINGEAL ARTERIES OF THE BRAIN, Their Morphological, Pathological and Clinical Significance, by *Henri M. Vander Eecken*, M.D. 160 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

YEAR BOOK OF ENDOCRINOLOGY (1958–1959 Year Book Series), edited by *Gilbert S. Gordon*, M.D., Ph. D., F.A.C.P. 384 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1959. Price $7.50.

BIOLOGICAL PSYCHIATRY, edited by *Jules H. Masserman*, M.D. 338 pages. Grune & Stratton, Inc., New York, N.Y., 1959. Price $9.75.

OFFICE GYNECOLOGY, by *J. P. Greenhill*, B.S., M.D., F.A.C.S., F.I.C.S. (Hon.). 7th edition, revised and enlarged. 572 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1959. Price $9.

BEHAVIOR PROBLEMS OF CHILDREN IN NAVY OFFICERS' FAMILIES, as Related to Social Conditions of Navy Family Life, by *Genevieve Gabower*, B.A., M.A. 279 pages. Catholic University of America Press, Washington, D.C., 1959. Price $3.

STAPHYLOCOCCAL DISEASE, Guide for Organizing Hospital In-Service Training Programs, produced by the U.S. Public Health Service's Communicable Disease Center, Atlanta, Ga. Copies may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $0.30.

HERNIA, by *Sir Heneage Ogilvie*, K.B.E., M.A., M. Ch., M.D., F.R.C.S. 132 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $6.50.

ABNORMAL HAEMOGLOBINS, A Symposium organized by the Council for International Organizations of Medical Sciences, edited by *J. H. P. Jonxis*, and *J. F. Delafresnaye*. 427 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $9.50.

THE PROCESS OF AGING IN THE NERVOUS SYSTEM, edited by *James E. Birren*, Ph. D.; *Henry A. Imus*, Ph. D.; and *William F. Windle*, Ph. D., Sc. D., with a foreword by *Pearce Bailey*, Ph. D., M.D. 32 contributors. 224 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.

HEAVY METALS AND THE BRAIN, by *John N. Cumings*, M.D., F.R.C.P. 161 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.

THE BIOLOGICAL, SOCIOLOGICAL AND PSYCHOLOGICAL ASPECTS OF AGING, by *Kurt Wolff*, M.D. 95 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $3.75.

METHODS OF GEOGRAPHICAL PATHOLOGY, Report of the study group convened by the Council for International Organizations of Medical Sciences, edited by *Richard Doll*. 72 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $2.50.

SYNOPSIS OF TREATMENT OF ANORECTAL DISEASES, by *Stuart T. Ross*, M.D., F.A.C.S., F.I.C.S. 240 pages; illustrated. C. V. Mosby Co., St. Louis, Mo., 1959. Price $6.50.

PHYSIOLOGY OF PREMATURITY, Transactions of the Third Conference, March 25, 26, and 27, 1958, edited by *Jonathan T. Lanman*, M.D. 157 pages; illustrated. Josiah Macy, Jr., Foundation, New York, N.Y., 1959. Price $3.

CLINICAL VETERINARY SURGERY. Volume I: General Principles and Diagnosis, by *R. H. Smythe*, M.R.C.V.S. 362 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959.

SUBCELLULAR PARTICLES, The Fifth Annual Symposium Publication of the Society of General Physiologists, edited by *Teru Hayashi*. 213 pages; illustrated. Ronald Press Co., New York, N.Y., 1959. Price $6.

LOW INTENSITY RADIUM THERAPY, by *Charles L. Martin*, E.E., M.D., F.A.C.R. and *James A. Martin*, M.D., F.A.C.R. 257 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959. Price $12.50.

A SHORT TEXTBOOK OF RADIOTHERAPY, for Technicians and Students, by *J. Walter*, M.A., B.M. (Oxfd.), M.R.C.P. (Lond.), F.F.R., D.M.R.E. (Camb.), and *H. Miller*, M.A., Ph. D. (Camb.), F. Inst. P. 2d edition. 527 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959.

NEUROPHARMACOLOGY, Transactions of the Fourth Conference September 25, 26, and 27, 1957, Princeton, N.J., edited by *Harold A. Abramson*, M.D. 285 pages; illustrated. Josiah Macy, Jr., Foundation, New York, N.Y., 1959. Price $5.

PROCEEDINGS OF THE WORLD CONGRESS OF GASTROENTEROLOGY and the 59th Annual Meeting of the American Gastroenterological Association, Washington, D.C., May 25 through 31, 1958, Volumes I and II. 1,363 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $20 for set of two volumes.

RESPIRATORY PHYSIOLOGY AND ITS CLINICAL APPLICATION, by *John H. Knowles*, M.D. 256 pages; illustrated. Harvard University Press, Cambridge, Mass., 1959. Price $5.25.

PRINCIPLES OF PATHOLOGY, by *Howard C. Hopps*, M.D., illustrated by *Lenore Megnin Sloan* and *George Newman*. 301 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N.Y., 1959.

PRACTITIONERS' CONFERENCES, held at New York Hospital-Cornell Medical Center. Volume VII, edited by *William J. Grace*, M.D. Foreword by *E. Hugh Luckey*. 275 pages. Appleton-Century-Crofts, Inc., New York, N.Y., 1959.

DENTAL CLINICS OF NORTH AMERICA, Symposia on Interceptive Orthodontics, and Problems of Oral and Facial Pain, July 1959. *T. M. Graber*, D.D.S., Ph. D., and *R. Gordon Agnew*, D.D.S., Ph. D., consulting editors; 25 contributors. 590 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa.

COLE & ELMAN'S TEXTBOOK OF SURGERY, by *Warren H. Cole*, M.D., with 49 contributing authors and consultants, 7th edition. 1,224 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N.Y., 1959. Price $17.

ARTHRITIS, General Principles, Physical Medicine, Rehabilitation, edited by *Edward W. Lowman*, M.D., with 24 collaborators. Foreword by *Howard A. Rusk*, M.D. 292 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959. Price $9.50.

CARE OF THE SURGICAL PATIENT, by *Jacob A. Glassman*, M.D., F.A.C.S., F.I.C.S., and *Raymond W. McNealy*, M.D., F.A.C.S., F.I.C.S. 320 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $6.50.

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